SERVICE MANUAL

HIGH－RESOLUTION DISPLAY MONITOR

MODEL HC3905 SERIES
HC3915R

MITSUBISHI ELECTRIC

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HC3915R

MITSUBISHI ELECTRIC CORPORATION

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Rev. B

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X－RADIATION WARNING

The surface of picture tube may generate X－Radiation.
Precaution during servicing, and if possible use of a lead apron or metal for shielding is recommended. To avoid possible exposure to X－radiation and electrical shock hazard, the high voltage compartment and the picture tube shield must be kept in place whenever the chassis is in operation. When replacing picture tube use only designated replacement part since it is a critical component with regard to X－Radiation as noted above.
The high－voltage specification is described on page 4.

CRITICAL COMPONENT REPLACEMENT WARNING

The components marked "⚠" are critical components for X－ray radiation.
When replacing these parts, use exactly the same one
If broken the critical component, please contact with qualified personnel of Mitsubishi Eelectric Corp. or the company which indicated on name plate.

注　意

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CAUTION

These products or technologies are subject to Japanese and／or COCOM strategic restrictions, and diversion contrary thereto is prohibited.

1. SPECIFICATION

1.1 FEATURES

1) FULL COMPATIBLE TO THE IBM P.C.:

THE SIZE AND POSITION OF THE PICTURE TO OPERATE THE IBM SYSTEM (8514A PERSONAL SYSTEM/2 OF 3 LINE MODES AND EGA EACH BOARDS), THE APPLE SYSTEM (MAC II) AND THE 800×600 RESOLUTION SYSTEM ARE AUTOMATICALLY ADJUSTED.

IN ADDITION 6, MANUAL ADJUSTMENT TO THE OTHER COMPUTER CAN BE AVAILABLE WITH THE PICTURE CONTROL KEYS.

2) VIDEO SIGNAL CAN BE INPUT ON A D-SUB AND BNC CONNECTOR:

RGB TTL SEPARATE (8 COLORS), RGBI TTL SEPARATE (16 COLORS PASTEL/SATURATION), RGB R'G'B' TTL SEPARATE (64 COLORS) AND RGB ANALOG SIGNALS CAN BE INPUT TO D-SUB CONNECTOR. ALSO, RGB ANALOG SINGAL CAN INPUT TO BNC CONNECTOR. IN ADDITION, TTL TEXT MODE CAN BE USED BY SWITCHED TO TEXT POSITION.

3) AUTO-TRACKING FUNCTION:

AUTOMATICALLY TRACKING AND SYNCHRONIZATION OVER A WIDE RANGE OF HORIZONTAL (15.7-38.0KHz) AND VERTICAL (45-90KHz) SCANNING FREQUENCIES CAN BE DISPLAYED CORRECTLY IN THE SCREEN OF MONITOR BY THE AUTO-TRACKING FUNCTION, WITHOUT ANY ADJUSTMENTS.

1.2 ELECTRICAL SPECIFICATIONS

1) CRT DESCRIPTION

(1) SEZE	:	20 INCH DIAGONAL(19"V)
(2) DEFLECTION ANGLE	:	90 DEGREE DIAGONAL
(3) ELECTRON GUN	:	IN-LINE TYPE
(4) FOCUSING METHOD	:	ELECTROSTATIC
(5) CONVERGENCE METHOD	:	MAGNETIC
(6) MASK TYPE	:	BLACK MATRIX
(7) TRIO SPACING	:	0.31mm
(8) ARRAY	:	DOT TRIOS
(9) PHOSPHOR TYPE	:	B22 (BL9 ALSO AVAILABLE)
(10) PHOSPHOR PERSISTENCE	:	SHORT (OR LONG)

(11) FACE PLATE : TINTED (52%)

(12) SURFACE TREATMENT : NON-GLARE (DM COATING)

(13) IMPLOSION PROTECTION : BANDED WITH MOUNTING LUGS

2) POWER SUPPLY

(1) VOLTAGE : AC90～132V/AC198～264V

(2) FREQUENCY : 47～63Hz (AUTOMATICALLY SELECTED)

(3) POWER CONSUMPTION : 140Watts (Max.)

(4) INRUSH CURRENT : LESS THAN 50A (0-PEAK)

(5) AC LEAKAGE CURRENT : LESS THAN 750μA (MEASURED BY IEC-380)

3) SIGNAL INPUT

(1) ANALOG VIDEO INPUT (R.G.B CHANNELS)

- INPUT VOLTAGE : 0.7Vp-p (0.5～2.0Vp-p AVAILABLE)
- INPUT IMPEDANCE : 75ohm TO GND/HIGH SWITCHABLE
- SIGNAL POLARITY : POSITIVE WHITE

(2) TTL VIDEO INPUT (R.G.B.I OR R. R'.G.G'.B.B')

- INPUT VOLTAGE : 0.0 TO 0.4V LOW LEVEL
  : 2.7 TO 5.0V HIGH LEVEL
- INPUT IMPEDANCE : 330ohm TO GND
- SIGNAL POLARITY : POSITIVE WHITE

(3) SEPARATE/COMPOSITE SYNC.

- INPUT VOLTAGE : 1.5 TO 5.0Vpp
- INPUT IMPEDANCE : 75ohm TO GND / HIGH
- SIGNAL POLARITY : POSITIVE/NEGATIVE

(4) COMPOSITE SYNC. ON GREEN OF ANALOG VIDEO SINGAL

- INPUT VOLTAGE : 0.3Vp-p (SYNC.) 0.7Vp-p (VIDEO)
- INPUT IMPEDANCE : 75ohm TO GND / HIGH
- SIGNAL POLARITY : NEGATIVE

(5) H-SYNC SIGNAL

- LINE TIME : 26.31～64μs
- BLK. TIME : 5.1μs min
- SYNC PULSE WIDTH : 1～7μs

(6) • FRAME TIME : 11.1～22ms

• BACK PORCH : 0.62ms Min.

• SYNC PULSE WIDTH : 50～300μs

4) DEFLECTION

(1) HORIZONTAL

AUTOMATIC SYNCHRONIZATION : 15.7KHz - 38.0KHz

(2) VERTICAL

AUTOMATIC SYNCHRONIZATION : 45Hz - 90Hz

5) HIGH VOLTAGE

HIGH VOLTAGE AT CRT ANODE : 27.0KV(TYP) AT 450μA

6) DEGAUSSING

MANUAL DEGAUSSING : ACTIVATED AT DEGAUSS SW ON.

2. CIRCUIT DESCRIPTION

2.1 POWER SUPPLY BLOCK

2.1.1 GENERAL

(1) THE POWER SUPPLY BLOCK CAN BE OPERATED IN CASE EITHER AC100-120V OR AC200-240V POWER LINE.

(2) THE SELECTION OF POWER LINE VOLTAGE IS PERFORMED AUTOMATICALLY BY IC901.

(3) THE OUTPUT LINES OF THIS POWER SUPPLY ARE SHOWN AS TABLE 2-1-1 WITH THEIR MAIN LOADS.

(4) THE POWER SUPPLY WORKS AS SWITCHED MODE OPERATION WITH RCC (RINGING CHOKE CONVERTER) CONFIGULATION. OUTPUT VOLTAGES ARE REGULATED BY 3RD WINDING. THE SWITCHING FREQUENCY IS CORRESPONDING TO LOAD CURRENTS.
THE 45V-110V LINE IS REGULATED BY THE DC CHOPPER METHOD FROM 135V LINE.

VOLTAGE LINE	ACTUAL OUTPUT VOLTAGE	MAIN LOAD
135V	135V	HIGH VOLTAGE POWER SUPPLY
+B	45～110V	HORIZONTAL DEFLECTION POWER SUPPLY
80V	80V	VIDEO AMPLIFIER CIRCUIT
28V	28V	VERTICAL DEFLECTION CIRCUIT
24V	24V	HORIZONTAL TRACKING CIRCUIT
12V	12V	VIDEO AMP, VERTICAL TRACKING CIRCUIT
5V	5V	CONTROL CIRCUIT WITH MPU/GATE ARRAY
-6.3V	-6.3V	CRT HEATER

TABLE 2-1-1

2.1.2 RECTIFY AND FILTER CIRCUIT

(1) THE AC INPUT VOLTAGE IS RECTIFIED BY THE DIODE BRIDGE D901.
THE RECTIFIED VOLTAGE IS FILTERED BY CHARGING C901 AND C902.

(2) IN CASE OF AC100-120V LINE INPUT, THE RECTIFY CIRCUIT WORKS AS MULTI-FALD RECTIFIER CIRCUIT CONTROLLED BY IC901.
IN CASE OF AC200-240V LINE INPUT. THE RECTIFY CIRCUIT WORKS AS A NORMAL FULL WAVE RECTIFIER CIRCUIT CONTROLLED BY IC901.

(3) THE THERMISTOR TH901 IS EQUIPPED TO SUPPRESS THE INRUSH CURRENT WHEN POWER SWITCH IS TURNED ON. THE TRIAC Q905 SHUNTS TH901 TO ELIMINATE THE POWER LOSS OF TH901 AFTER THE CONTROL CIRCUIT STARTS TO OSCILLATE.

2.1.3 DEGAUSS CIRCUIT

(1) THIS MONITOR IS EQUIPPED THE MANUAL DEGAUSS FUNCTION. WHEN DEGAUSS SWITCH SW902 IS TURNED ON, THE DEGAUSS CURRENT IS FED THROUGH DEGAUSS COIL AND POSISTOR RP901 OR RP902.
THE POSISTOR RP901 AND RP902 ARE SELECTED BY RY901 ACCORDING TO AC INPUT VALTAGE.
THE RELAY RY901 IS SWITCHED AUTOMATICALLY BY IC901 DEPENDING ON AC INPUT VOLTAGE. THEN DEGAUSS CIRCUIT WORK CORRECTLY BOTH AC100-120V AND AC200-240V.

2.1.4 PRIMARY CIRCUIT

(1) MAIN DC POWER SUPPLY OF THIS MONITOR CONSISTS OF RCC (RINGING CHOKE CONVERTER). WHEN POWER SW IS TURNED ON, TRIGGERING CURRENT IS FED THROUGH R905 AND R909 TO THE ③ PIN OF IC991 TO FLOW THE COLLECTOR CURRENT OF Q1 IN IC991. THE COLLECTOR CURRENT OF Q1 BEGINS TO FLOW, THEN INDUCTIVE VOLTAGE IS GENERATED BETWEEN ⑧ AND ⑥ PINS OF T931 SO THAT THE DIFFERENTIAL BASE CURRENT CAUSED BY C908 AND R904 GIVES TO THE BASE OF Q1.
AS THE LOAD CURRENTS OF SECONDARY WINDING AT POWER SWITCHED ON ARE VERY SMALL, VERY SMALL PEAK COLLECTOR CURRENT I_P' OF Q1 IS NEEDED.
THE CIRCUIT COMES TO STABILIZE BY REPRATING THE ACTION STATED ABOVE.

(2) IN NORMAL OPERATING CONDITION, THE CIRCUIT WORKS AS FOLLOWS.
THE COLLECTOR CURRENT I_C OF Q1 INCREASES ACCORDING TO THE EQUATION OF
$I_C = \frac{V_I}{Lp} T_{ON}$. (Lp:PRIMARY WIDING INDUCTANCE V_I:INPUT VOLTAGE)

2.2.3 VERTICAL DEFLECTION CIRCUIT

VERTICAL DEFLECTION IS PERFORMED BY ONE IC, AND SOME ATTACHED COMPONENTS.

(1) THE OSCILLATING FREQUENCY IS CONTROLLED BY APPLYING D.C. VOLTAGE AT 4PIN OF IC401 VIA Q401, 13PIN OF IC506. IF THE D.C. VOLTAGE AT 4PIN OF IC401 IS HIGHER AND THRESHOLD LEVEL GOES TO HIGH, OSCILLATING FREQUENCY GOES TO LOWER.

(2) Q402 WORKS AS HEIGHT CONTROLLER TO BE CHANGED THE BASE BIAS VOLTAGE, WHEN BASE VOLTAGE IS HIGHER, HEIGHT GOES TO WIDER.

WHEN THE I_C REACHES $I_P = I_B \times hfe$, V_{CE} OF Q1 INCREASE IMMEDIATELY AND THE CHARGE CURRENT FOR C922 FLOWS THROUGH D1 AND D909.
IN THE SAME TIME SECONDARY CURRENTS BEGIN TO FLOW THROUGH D951~D955.
AS SOON AS THE ENERGY WHICH IS STORED IN PRIMARY WINDING OF T931 TRANSFERS TO SECONDARY CIRCUIT, THE CURRENTS THROUGH D951~D955 ALSO REACH TO 0 (ZERO). IN THAT TIME ALL WINDING VOLTAGES OF T931 ARE ZERO, AND THE Q1 STARTS BY TRIGGERING RESISTOR R905 AND R909. NEXT CYCLE BASE CURRENT OF Q1 IS SUPPLYED FROM THE CHARGE OF C922 BY Q2 TURNED ON.

(3) THE THIRD WINDING ⑦−⑥ WORKS AS THE DETECTOR TO STABILIZE THE SECONDARY VOLTAGE. IF THE VOLTAGE OF SECONDARY WIDINGS INCREASE, VOLTAGE OF ⑦−⑥ ALSO INCREASE. SO THE RECTIFIED VOLTAGE WHICH IS SUPPLIED TO ⑨ PIN OF IC991 INCREACES TO BY-PASS THE BASE CURRENT OF Q1 THROUGH Q5, Q3. IN THAT RESULT OUTPUT VOLTAGE DECREASE.

(4) D914 AND D915 WORK AS THE PROTECTOR FOR EXCESS AC VOLTAGE. IF THE IC901 IS BROKEN IN CONDITION OF CONTINUING MULTI FOLD RECTIFIER CIRCUIT AND THE AC INPUT IS CONNECTED TO 200V LINE, THEN THE AVANCHE DIODE D914 AND D915 WILL BE ON TO SHORTEN THE CIRCUIT. SO THE FUSE F901 WILL BE BLOWED, AND COMPONENTS ARE AVOIDED TO BE BROKEN.

2.1.5 SECONDARY CIRCUIT

(1) IN THIS PARAGRAPH CHOPPER CIRCIT WHICH IS APPLIED FOR AUTO-SCANNING CIRCUIT WILL BE EXPLAINED.

(2) CHOPPER CIRCUIT MAINLY CONSISTS OF T951, Q951, Q952, Q953.
DURING THE Q951 IS TURNED ON, BASE CURRENT OF Q951 IS SUPPLIED BY THE DISCHARGE CURRENT FROM C969. WHEN I_C OF Q951 REACHES TO THE SATURATED LEVEL $I_P = I_B \times hfe$, Q951 IS TURNED OFF IMMEDIATELY. THEN THE VOLTAGE ⑥PIN INCREASE TO CHARGE THE C969 THROUGH D958 TO PREPARE THE NEXT SWITCHING CYCLE.
THE OUTPUT VOLTAGE +B (Q951 EMITTER VOLTAGE) IS REGULATED BY FOLLOWING PROCEDURE. IF THE VOLTAGE OF F/B TERMINAL IS HIGHER, BASE CURRENT OF Q953 INCREASE. SO THE BASE CURRENT OF Q952 ALSO INCREASE TO BY-PASS THE BASE CURRENT OF Q951. IN THAT RESULT, PEAK COLLECTOR CURRENT I_P OF Q951 DECREASES TO LOWER THE OUTPUT VOLTAGE.

2.2 DEFLECTION BLOCK

DEFLECTION BLOCK CONSISTS OF HORIZONTAL, VERTICAL AND HIGH VOLTAGE CIRCUITS, AND ARE FUNDAMENTATLY OPERATED BY CHANGING D.C. CONTROL VOLTAGES.

2.2.1 HORIZONTAL DEFLECTION CIRCUIT

(1) ALL D.C. CONTROL VOLTAGES ARE FED FROM IC505, IC506 WHICH ARE LOCATED ON PWB-TERM.

NEGATIVE H-SYNC SIGNAL IS FED THROUGH #10 OF CONNECTOR DI FROM PWB-TERM., IF H-OSCILATION FREQUENCY IS HIGHER, 501 RELATIVE D.C. VOLTAGE OF 7PIN OF IC502 IS LOWER, THEN THE CHARGE CURRENT TO ADD TO TIME CONSTANT CIRCUIT CONSISITING OF R520 AND C505 INCREASES TO SHORATEN CHARGE TIME. SO THE OSCILLATION FREQUENCY GOES TO HIGHER WHEN NO SYNC SIGNAL IS CONNECTED, FREE RUNNING FREQUENCY IS ABOUT 25KHz.

(2) THE OUTLPUT OF 13PIN OF IC501 WORKS AS A DRIVE VOLTAGE FOR H-DEFLECTION, AND HV CIRCUITS. THE PRINCIPLE OF HORIZONTAL DEFLECTION IS SHOWN IN FIG. 2-2-2 THE VOLTAGE IN FIG. 2-2-2 INDICATE APPROX. VALUE AT 38KHz OPERATION. Q591 WORKS AS A HORIZONTAL OUTPUT, AND D591 AND D545 WORK AS DUMPER DIODES. Q531, Q532, Q533, Q534, AND RY501 ARE SWITCHED ON AS FOLLOWS IN ACCORDANCE WITH THE HORIZONTAL FREQUENCY TO COMPENSATE THE HORIZONTAL LINEARITY.

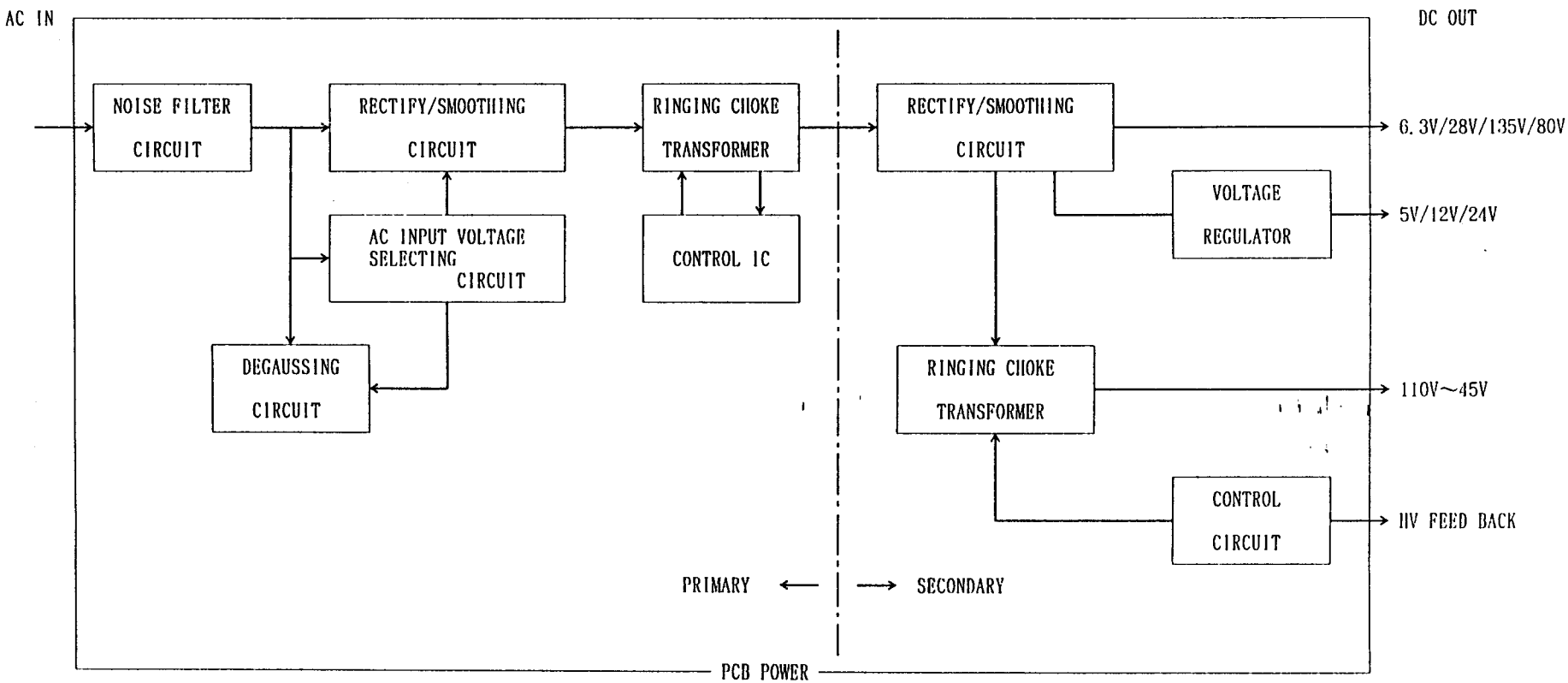
(3) IN FIG. 2-2-2, THE HORIZONTAL OUTPUT TR Q591 IS TURNED ON BY THE DRIVE PULSE FROM IC501 VIA Q505 AND Q506.

DURING Q591 IS TURNED ON, THE DEFLECTION CURRENT I_{DY} INCREASE FROM 0 TO POSITIVE MAX, I_P IN ACCORDANCE WITH THE EQUATION $I_F = V_{CC} \times I_{on}/L_{DY}$, ($L_{DY}$: PARALLEL VALUE OF HOT AND DY)

WHEN THE DRIVE PULSE GOES TO NEGATIVE POLARITY, Q591 IS TURNED OFF, AND I_{DY} BEGINS TO FLOW TO CHARGE C591 AND C592 UNTIL V_{CP} REACHES MAXIMUM VALUE $3.14 \times T_s \times V_{CC}/(2 \times T_r)$

AS SOON AS V_{CP} REACHES MAXIMUM VALUE, DISCHARGE CURRENT FROM C591 AND C592 FLOWS TO DY.

FIG. 2-1-1 BLOCK DIAGRAM OF POWER SUPPLY CIRCUIT



THIS CHARGE AND DISCHARGE PERIOD IS CALLED "RETRACE TIME" WHICH IS EXPRESSED BY EQUATION $T_r = 3.14\sqrt{L_{DY} \times C_r}$

WHEN THE V_{CF} REACHED TO 0V, THE DUMPER DIODES ARE TURNED ON AND I_{DY} BEGINS TO FLOW FROM $-I_P$ TO 0 AMPERE.

THE HORIZONTAL OUTPUT TRANSFORMER T502 WORKS AS A CHOKE COIL CONNECTIONG BETWEEN DEFLECTION YOKE AND POWER SUPPLY, AND ALSO WORKS TO GET SOME D.C. POWER SOURCES.

(4) THE POWER SUPPLY VOLTAGE CONNECTED TO 7PIN OF T502 IS MODULATED TO PARABOLIC WAVE FORM FROM BY Q511 AND Q593 TO COMPENSATE SIDE PIN CUSHION (EAST-WEST) DISTORTION. THE PARABOLIC WAVE IS GENERATED AND AMPLIFIED BY PWB-PCC AND FED THROUGH BUFFER AMPLIFIERS Q510 TO THE BASE OF Q511 TO MODULATE. ALSO 7PIN FO T502 VOLTAGE IS VARIED FROM ABOUT 40V TO 110V TO REGULATE THE HORIZONTAL WIDTH REGARDLESS OF HORIZONTAL FREQUENCY.

THIS IS PERFORMED TO MAINTAIN THE D.C. VOLTAGE OF THE CATHODE OF D505 WHICH IS PROPORTIONAL TO COLLECTOR VOLTAGE OF Q591.

IF D.C. VOLTAGE ACROSS C542 IS HIGHER 12PIN VOLTAGE OF CONNECTOR D5 ALSO INCREASES. SO THE +B VOLTAGE OF 1PIN OF D5 BECOMES LOWER IN PROCEDURE STATED IN 2.1.5 (2). (SEE ATTACHED FIG. 2-2-4)

(5) Q507, Q508, Q509, AND Q592 CONSIST OF REGULATOR TO OPTIMIZE CONDITION OF H-DEFLECTION OUTPUT TR Q591. OUTPUT VOLTAGE OF Q592 IS CONTROLLED BY 2 MODES.

(5-1) IF THE H-WIDTH CONTROLL VOLTAGE FROM 1PIN OF IC504 DECREASES, EMITTER CURRENT OF Q509 ALSO DECREASES, THEN OUTPUT VOLTAGE OF Q592 INCREASES TO SUPPLY ENOUGH DRIVING POWER FOR Q591.

REFER TO FIG. 2-2-3.

(5-2) ON THE OTHER HAND, WHEN THE 11PIN VOLTAGE OF IC505 DECREASES ACCORDING TO THE LOWER HORIZONTAL FREQUENCY, BASE VOLTAGE OF Q507 ALSO DECREASES, SO THE OUTPUT VOLTAGE OF Q592 INCREASE TO OPTIMIZE THE BASE CURRENT OF Q591. REFER TO FIG. 2-2-4.

BY THE MANNER STATED (5-1) AND (5-2), Q591 IS DRIVEN ENOUGH, AND POWER LOSS MINIMIZED.

Fig. 2-2-3

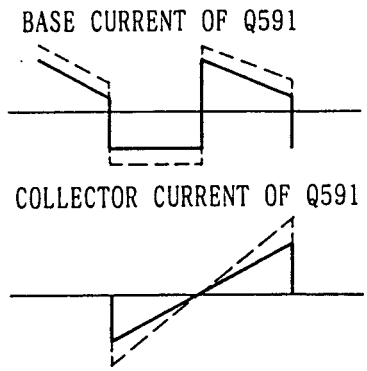
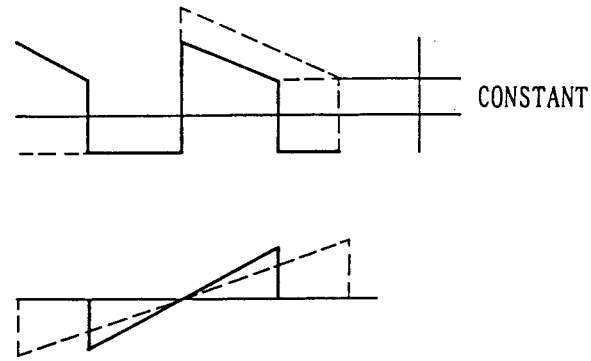
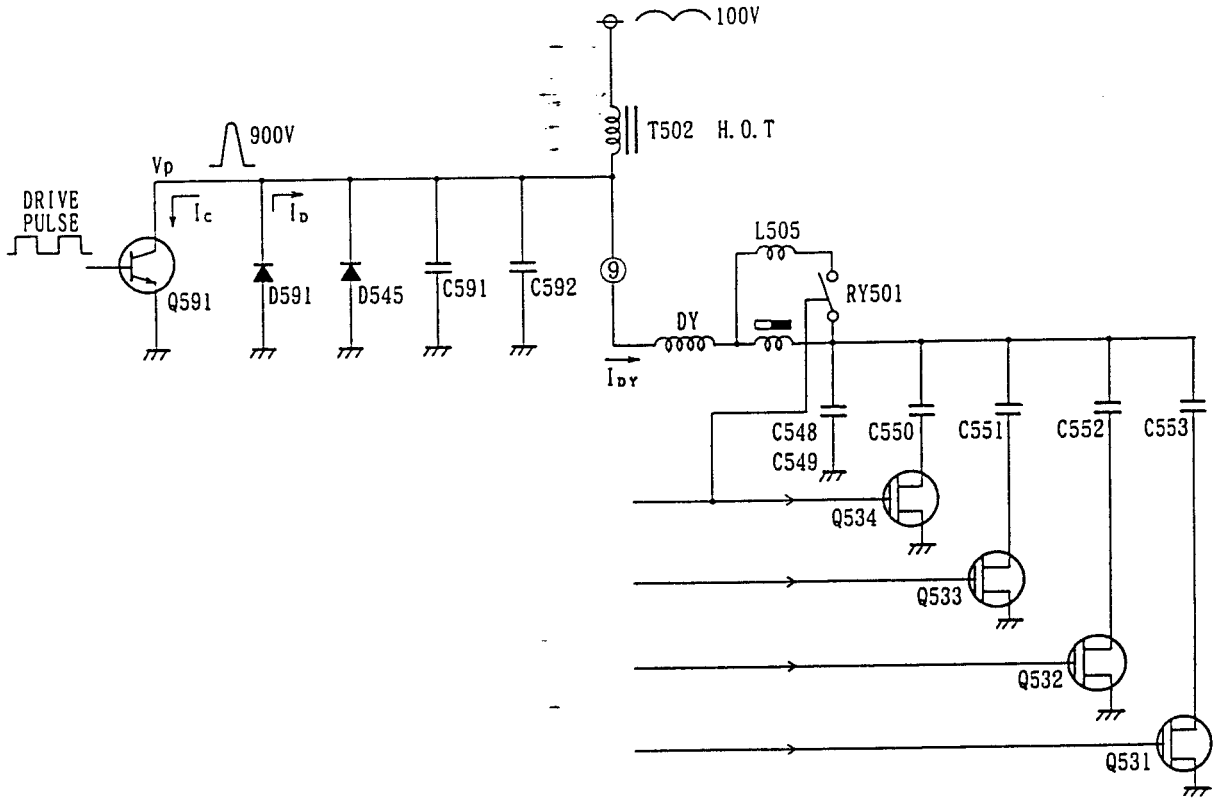


Fig. 2-2-4



(6) 1, 3PIN OF CONNECTOR D2 ARE CONTROL SIGNALS TO CHANGE A.F.C. COMPONENT C525 ~C528 AND R516~R519. COMBINATION OF THESE ARE AS FOLLOWS. SEE TABLE.2-2-1.



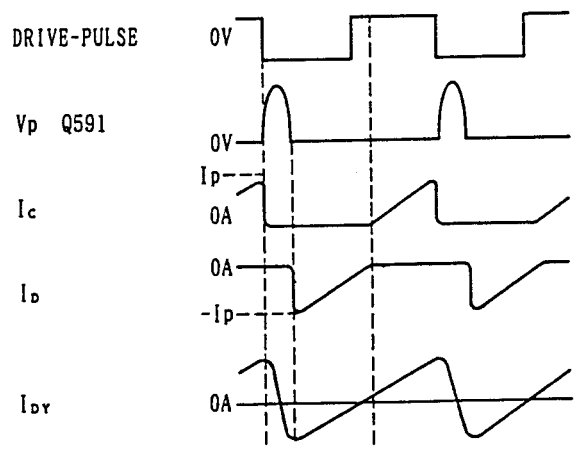


FIG. 2-2-1 PRINCIPLE OF HORIZONTAL DEFLECTION

2.2.2 HIGH VOLTAGE CIRCUIT

(1) HIGH VOLTAGE SUPPPLY AND CONTROL CIRCUIT

THE PRINCIPLE OF THE HIGH VOLTAGE SUPPLY CIRCUIT IS BASICALLY SAME AS THE HORIZONTAL DEFLECTION.

THE DRIVE PULSE WHICH IS SAME AS THE HORIZONTAL DEFLECTION, IS CONNENTED TO BASE OF Q594 VIA Q517 AND SWITCHES Q594. THE FLY BACK TRANSFORMER STEPS UP COLLECTOR PULSE GENERATED TO THE HIGH VOLTAGE WHEN Q594 TURNED OFF TO THE HIGH VOLTAGE.

THE HIGH VOLTAGE SHOULD BE STABILIZED TO PREVENT THE FLUCTUATION OF THE SIZE OF THE IMAGE ON SCREEN REGARDLESS OF BEAM CURRENT. IN THIS CIRCUIT, THE SUPPLY VOLTAGE IS CONTROLLED TO STABILIZE THE HIGH VOLTAGE OUTPUT.

THE SERIES REGULATOR COMPOSED OF Q595, Q520 AND Q519 CONTROLLS THE SUPPLY VOLTAGE OF THE CIRCUIT.

THE HIGH VOLTAGE IS DIVIDED BY THE HIGH VOLTAGE RESISTOR, APPROX. 800 MEGA OHMS, EQUIPPED INSIDE THE FLY BACK TRANSFORMER, AND R5B6.

THIS VOLTAGE IS FED TO THE BASE OF Q519 WHICH WORKS AS THE ERROR AMPLIFIER FOR THE SERIES REGULATOR VIA THE EMITTER FOLLOWER Q521, AND IS COMPARED WITH REFERENCE VOLTAGE STABILIZED BY D524.

IF THE HIGH VOLTAGE INCREASES, THE FEED BACK VOLTAGE ALSO INCREASES, AND THE BASE CURRENT OF Q519 INCREASES AND THE COLLECTOR VOLTAGE OF Q519 DECREASES, AND THEN THE EMITTER VOLTAGE OF Q595 DECREASES, IT MEANS THE DECREASE OF THE SUPPLY VOLTAGE TO THE HIGH VOLTAGE CIRCUIT, AND THE INITIAL INCREASE OF THE HIGH VOLTAGE IS CORRECTED.

Q535 - Q537 (RY505-507) ARE SWITCHED ON AS FOLLOWS IN ACCORDANCE WITH THE HORIZONTAL FREQUENCY TO CHANGE THE TOTAL VALUE OF THE RESONANCE CAPACITOR C573, C574 AND C576. (SEE ATTACHED TABLE 2-2-1)

THE HIGH VOLTAGE IS SET TO THE PREARRANGED VALUE (27KV STD.) BY VR503 (HV-ADJ).

(2) HIGH VOLTAGE SAFETY CIRCUIT

-=CAUTION=-
SAFETY CIRCUIT DESCRIBED BELOW ARE EQUIPPED TO PREVENT ABNORMAL INCREASE OF THE HIGH VOLTAGE THAT MAY CAUSE A X-RADIATION OF HARMFUL LEVEL.
NO MODIFICATION SHOULD BE APPLIED TO THE HIGH VOLTAGE SUPPLY AND SAFETY CIRCUIT.

THE SAFETY CIRCUIT WORKS AS THE OVER VOLTAGE PROTECTOR FOR THE HIGH VOLTAGE.
THE HIGH VOLTAGE IS DIVIDED BY THE HIGH VOLTAGE RESISTOR, APPROX. 550 MEGA OHMS, EQUIPPED INSIDE THE FLY BACK TRANSFORMER, AND R5C1.
THIS VOLTAGE IS FED TO THE BASE OF Q522 WHICH WORKS AS THE EMITTER FOLLOWER AND USED AS THE HIGH VOLTAGE DETECTING.
THE VOLTAGE OF ANODE OF D525 IS ADJUSTED TO THE TRIGGERING VOLTAGE LEVEL JUST IN CASE OF THE HIGH VOLTAGE REACHES 30KV, BY VR504 (HV-PRO).
WHEN THE HIGH VOLTAGE REACHES 30KV UNDER SOME TROUBLE CONDITIONS, X-RAY PROTECTION COMPONENT Q518 WORKS TO INHIBIT DRIVE PULSE FROM IC501.
SO NO SWITCHING OPERATION WHICH GENERATES HIGH BOLTAGE WORKS. AS Q517 IS THYRISTER, IT CONTINUES TO 0 UNTIL THE POWER SWITCH IS TURNED OFF BY THE OPERATER.

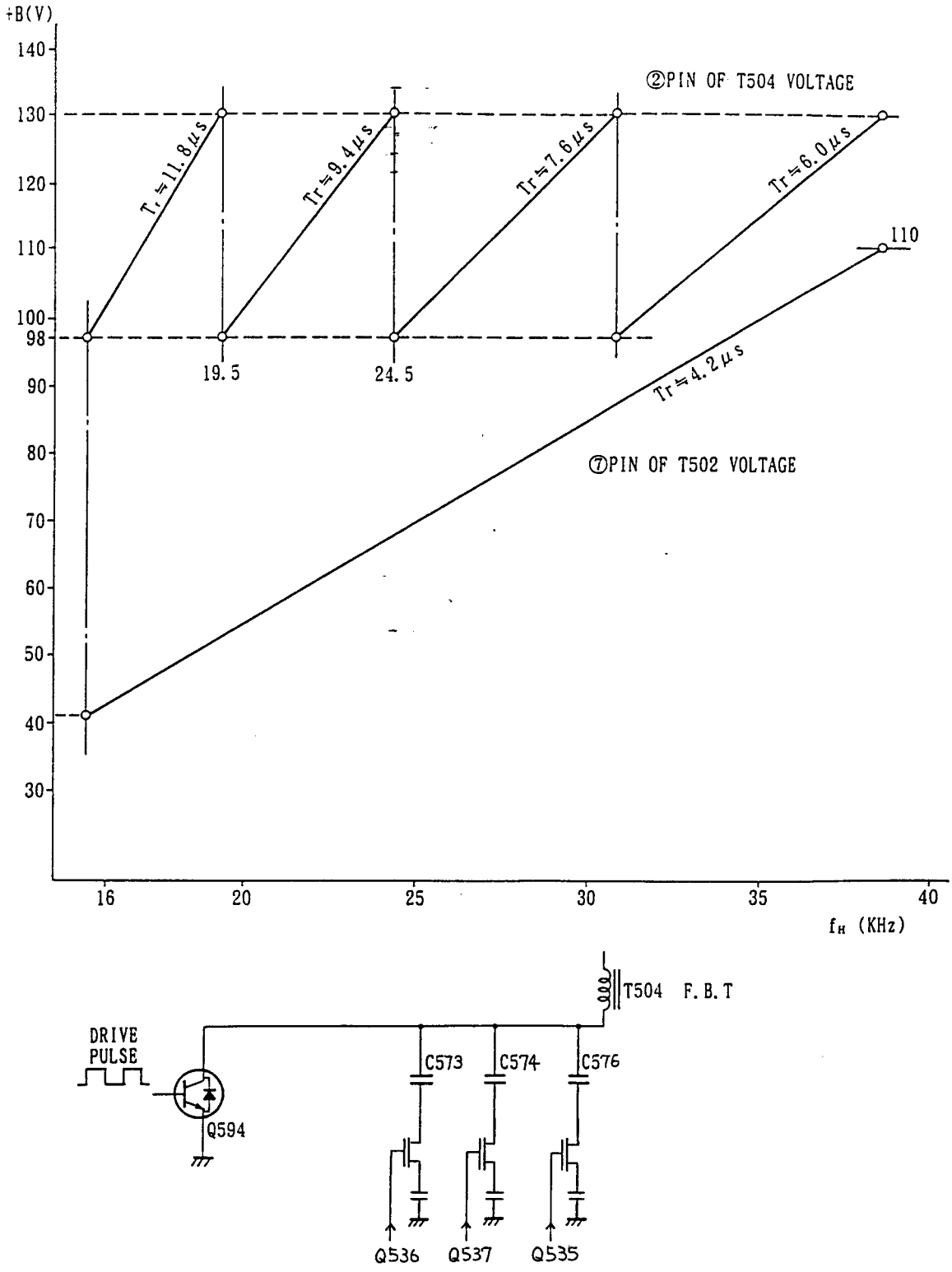


FIG. 2-2-4 SUPPLY VOLTAGES TO T502, T504 VS HORIZONTAL FREQ

TABLE 2-2-1 SWITCHED COMPONENTS VS HORIZONTALK FREQ.

fh (KHz)	HORZONTAL LINEARITY					RESONANE CAPACITOR OF HIGH VOLTAGE CIRCUIT			HORIZANTAL AFC				DRIVE
	C550	C551	C552	C553	L505	C573	C574	C576	C527 R519	C528 R517	C526 R516	C525 R518	⑪PIN (V) IC505
15	ON	ON	ON	ON	OFF	ON	ON	ON	ON	OFF	OFF	OFF	0
16													0.3
17													0.7
18			OFF										1.1
19				OFF					OFF	ON			1.5
20						OFF							1.8
21		OFF	ON	ON									2.2
22													2.6
23				OFF									3.0
24			OFF										3.3
25	OFF	ON	ON		ON		OFF						3.7
26			OFF	ON									4.1
27				OFF						OFF	ON		4.5
28													4.8
29													5.2
30		OFF	ON	ON									5.6
31								OFF					6.0
32													6.3
33				OFF									6.7
34													7.1
35			OFF	ON							OFF	ON	7.5
36													7.8
37													8.2
38				OFF									8.6

2.3 VIDEO

1) GENERAL

(1) THE MONITOR CAN BE INPUT THE FOLLOWING SIGNALS.

(1)-1 SEPARATED ANALOG VIDEO + SEPARATED TTL SYNC.

(1)-2 SEPARATED ANALOG VIDEO + SEPARATED ANALOG SYNC.

(1)-3 SEPARATED ANALOG VIDED + COMPOSITE TTL SYNC.

(1)-4 SEPARATED ANALOG VIDED + COMPOSITE ANALOG SYNC.

(1)-5 SYNC. ON GREEN

(1)-6 SEPARATED TTL VIDEO + SEPARATED TTL SYNC.

(1)-7 SEPARATED TTL VIDEO + COMPOSITE TTL SYNC.

THE TTL AND ANALOG SYNC. SIGNAL ARE AVAILABLE TO BOTH POLARITY (NEGATIVE OR POSITIVE).

(2) SELECTION OF INPUT SINGAL

THE SELECTION OF ANALOG OR TTL SIGNAL IS SELECTABLE BY S203.

(3) TTL INPUT

THE TTL INPUT SIGNAL IS CONVERTED TO DIGITAL TO ANALOG SIGNAL BY IC101 WHICH OUTPUT IS SELECTABLE TO 8 OR PASTEL 16 OR SATURATED 16 OR 64 COLORS BY COLOR MODE SELECT SWITCH.

THIS MONITOR HAS TEXT DISPLAY WHICH DISPLAY WHITE, GREEN OR AMBER MONOCHROME COLOR. (ONLY AT TTL INPUT)

(4) ANALOG INPUT

THE ANALOG INPUT SIGNAL OR DIGITAL TO ANALOG CONVERTED TTL SIGNAL IS INPUTTED TO PREAMPLIFIER IC201 WHICH ALSO CONTROLLS THE DC CLAMPING LEVEL, BIAS AND GAIN.

THE DC CLAMPING IS DETERMINED BY CLAMP PULSE OF ⑮ PIN AND CLAMP LEVEL VOLTAGE OF 16 PIN ON IC 201.

THE GAIN IS DETERMINED BY DC VOLTAGE OF ⑭ ON IC201.

EACH GAIN OF R, G OR B IS DETERMINED BY DC VOLTAGE OF ⑫, ⑧, OR ④ ON IC201.

(5) BRIGHT, CONTRAST, USER-VR

THE BRIGHTNESS CONTROL IS EQUIPPED TO CONTROL BIAS LEVEL AND THE CONTRAST CONTROL IS EQUIPPED TO CONTROL 3 VIDEO GAINS.

2) VIDEO CIRCUIT

THE VIDEO INPUT SIGNALS ARE INPUTTED FROM SHRINKED D-SUB ⑮ PIN CONNECTOR WHICH IS AVAILABLE TO BOTH ANALOG AND TTL SIGNAL LEVEL. (BNC IS USED ONLY ANALOG SIGNAL)

THE ANALOG OR TTL SIGNAL IS SELECTABLE BY S107, THEN INPUTTED TO PRE-AMPLIFIER IC201.

(1) BLOCK DIAGRAM OF VIDEO CIRCUIT

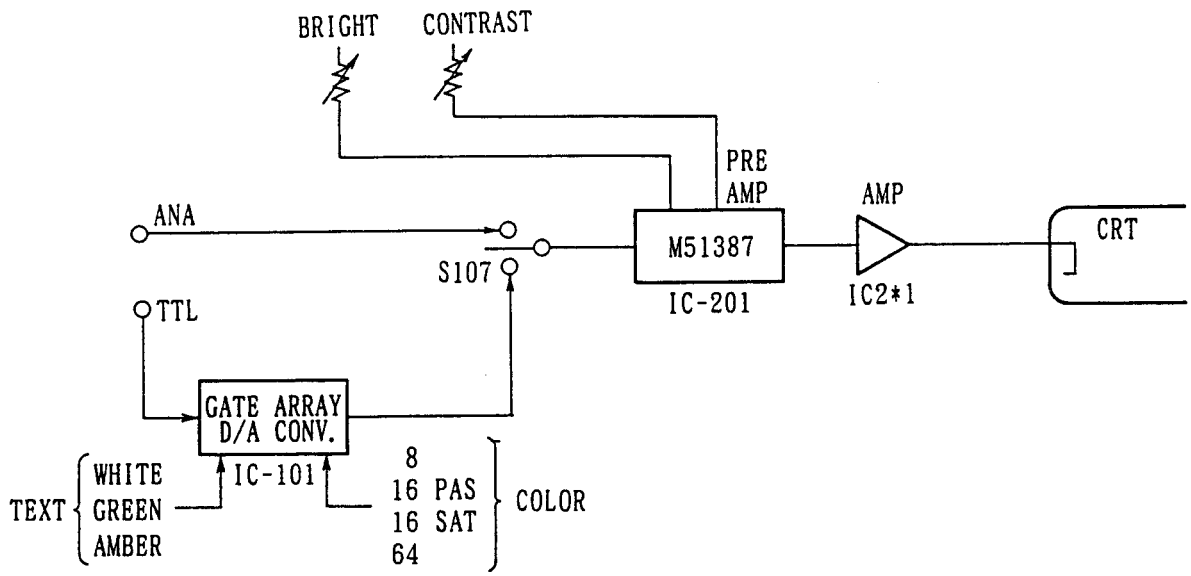


FIG 2-3-1

(2) PRE AMPLIFIER

(2)-1 THE TTL INPUT SIGNAL IS INPUTTED TO THE GATE ARRAY OF IC201, AND IS SELECTABLE TO THE FOLLOWING MODE BY MODE SELECTOR SWITCH ON THE REAR PANEL.

- TTL
  - COLOR
    - 8 COLORS
    - 16 PASTEL COLORS
    - 16 SATURATED COLORS
    - 64 COLORS
  - TEXT
    - GREEN
    - AMBER
    - WHITE

THE TTL SIGNAL WHICH IS CONVERTED TO ANALOG LEVEL IS OUTPUTTED FROM GATE ARRAY IC101 BY OPEN COLLECTOR.

THE CONVERTED SIGNAL IS APPLIED TO THE PRE-AMPLIFIER IC201 VIA S107.

(2)-2 THE ANALOG SINGAL IS DIRECTLY APPLIED TO THE PRE-AMPLIFIER IC201 VIA S107 VIDEO SIGNALS ARE CONTROLLED BIAS AND GAIN BY BRIGHTNESS AND CONTRAST POTENTIOMETERS THEN AMPLIFIED BY IC201.

(3) MAIN AMPLIFIER

THE OUTPUT OF PRE-AMPLIFIER IS APPLIED TO THE HYBRID IC'S IC2□1 WHICH AMPLIFY THE VIDEO LEVELS ENOUGH TO DRIVE CATHODES OF CRT TO 40Vp-p.

3) SYNC. SIGNAL

(1) AVAILABLE SYNC. SIGNAL

a. SEPARATE AND COMPOSITE TTL LEVEL WITH POSITIVE OR NEGATIVE POLARITY AT D-SUB.

b. SEPARATE AND COMPOSITE 1.5Vpp TO 5.0Vpp ANALOG LEVEL WITH POSITIVE OR NEGATIVE POLARITY AT BNC.

c. SYNC. ON GREEN WITH 0.3V ANALOG LEVEL AT D-SUB OR BNC.

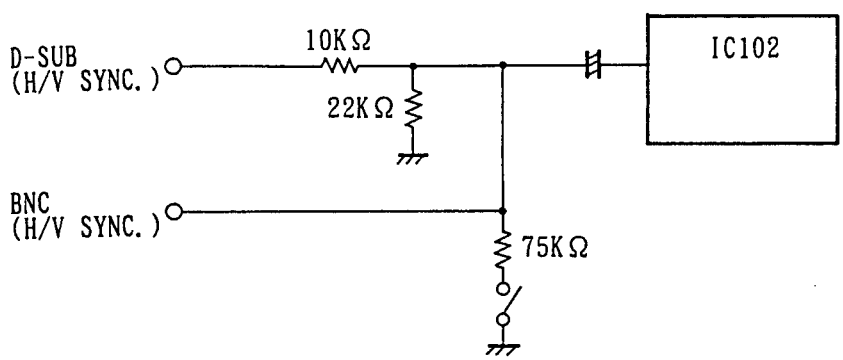


FIG 2-3-2 SYNC INPUT CIRCUIT

(2) SYNC. PROCESSOR

SYNC. SIGNAL IS PROCESSED TO GET CONSTANT TTL LEVEL AND DETECT POLARITIES IN THE IC102. IC102 OUTPUTS SEPARATE TTL LEVEL WITH POSITIVE POLARITY SYNC. FROM ㉕ PIN AND ㉑ PIN.

IC102 ALSO DECODES THE POLARITY OF SYNC. AND OUTPUTS DECODED SIGNALS FROM, ⑭, ⑯, ⑱ AND ⑲ PIN TO OPERATE THE CIRCUITS IN ACCORDANCE WITH VGA, SEE

TABLE 2-3-1.

IC102 CAN DETECT ALL KINDS OF SYNC. SIGNALS, THAT IS, SEPARATE, COMPOSITE AND SYNC. ON GREEN, AUTOMATICALLY.

INPUT		OUTPUT			
⑨ PIN(HD)	⑪ PIN($\overline{VD}$)	14	16	18	19
POS.	POS.	H	L	L	L
POS.	NEG.	L	H	L	L
NEG.	POS.	L	L	H	L
NEG.	NEG.	L	L	L	H

TABLE 2-3-1 POLARITY OF CONTROL SIGNAL FOR CPU

(4) CLAMP PULSE

CLAMP PULSE WHICH STABILIZE THE CRT CUT-OFF LEVEL REGARDLESS OF SCREEN IMAGE IS ALSO GOTTEN FROM IC104 INCASE OF CONNECTING S108 TO [NOR] POSITION.

THE RELATION BETWEEN H-SYNC SIGNAL AND CLAMP SIGNAL ARE AS FOLLOWS. IF S108 IS CONNECTED TO [INT] POSITION, TRAILING EDGE CLAMP PULSE IS OUTPUTTED.

	ANALOG		TTL	
	FH$<$26KHz	FH$\geq$26KHz	FH$<$26KHz	FH$\geq$26KHz
WIDTHS	1.5μs	1.0μs	1.5μs	1.0μs
TIMING	CLAMP-B		CLAMP-A	

TABLE 2-3-2 CLAMP PULSE WIDTH IN RELATION TO HORIZONTAL FREQ.

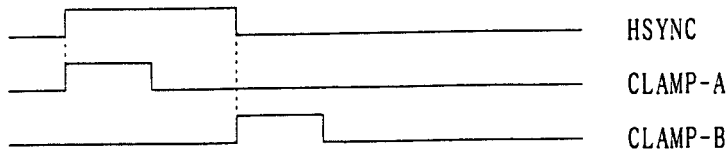


FIG 2-3-3 TIME RELATION BETWEEN H-SYNC AND CLAMP PULSE

2.4 CONTROL BLOCK

1) THE CONTROL BLOCK IS MAINLY LOCATED ON THE PCB TERM. IT HAS ONE MPU(IC104), ONE GATE. ARRAY(IC105), ONE UNVOLATILE MEMORY(IC106)D/A CONVERTERS(IC109), AND OTHER CONTROL ICS.

THE INPUT SIGNALS FOR MPU ARE FED FROM 2 TACT SWITCHES, ONE ROTARY SWITCH, AND ALSO INPUTTED SYNC. SIGNAL AND SYNC. POLARITY DETECTING SIGNAL.

BASED ON THE ABOVE SIGNALS MPU READS OUT DATA LIKE AS SCREEN SIZE, SCREEN POSITION ETC. WHICH ARE STORED IN UNVOLATILE MEMORY AND INTERNAL ROM, THEN STORES INTO RAM OF MPU. THESE INFORMATION ARE SENT FROM PORTS OF MPU. THE GENERAL FLOW CHART IS SHOWN IN FIG. 2-4-1, AND H/W BLOCK DIAGRAM IS SHOWN IN FIG. 2-4-2. THE INFORMATION LIKE AS AFC CONSTANT, C_S CHANGING AND C_R CHANGING IS SHOWN IN TABLE 2-4-1.

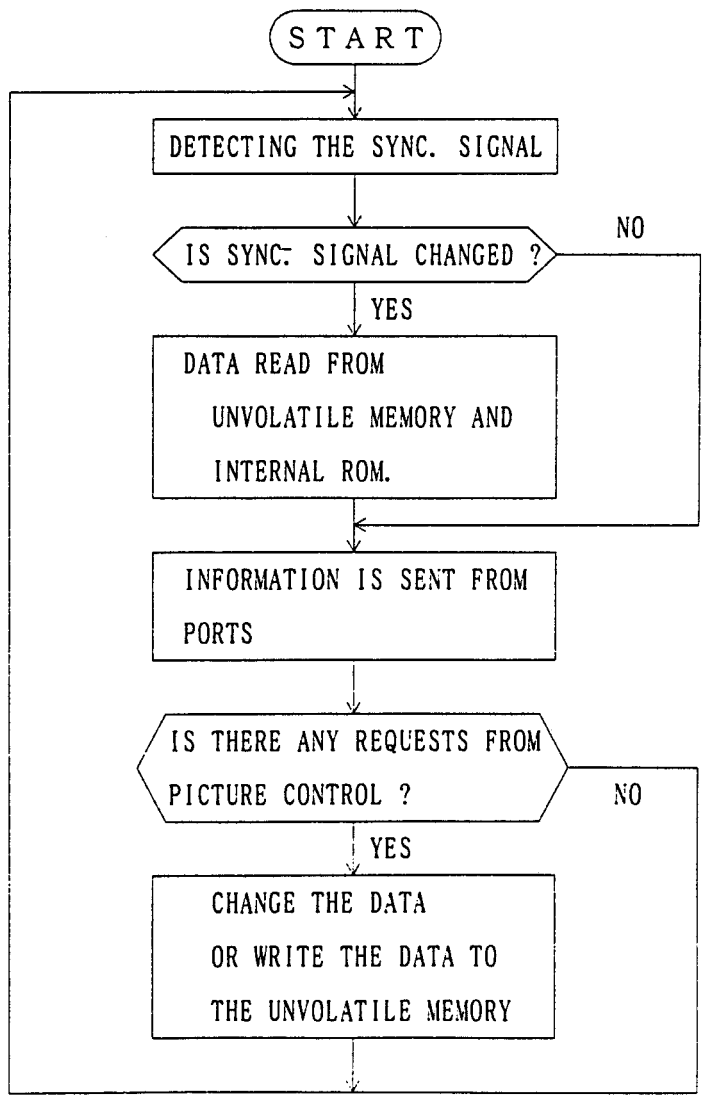


FIG 2-4-1 GENERAL FLOW CHART

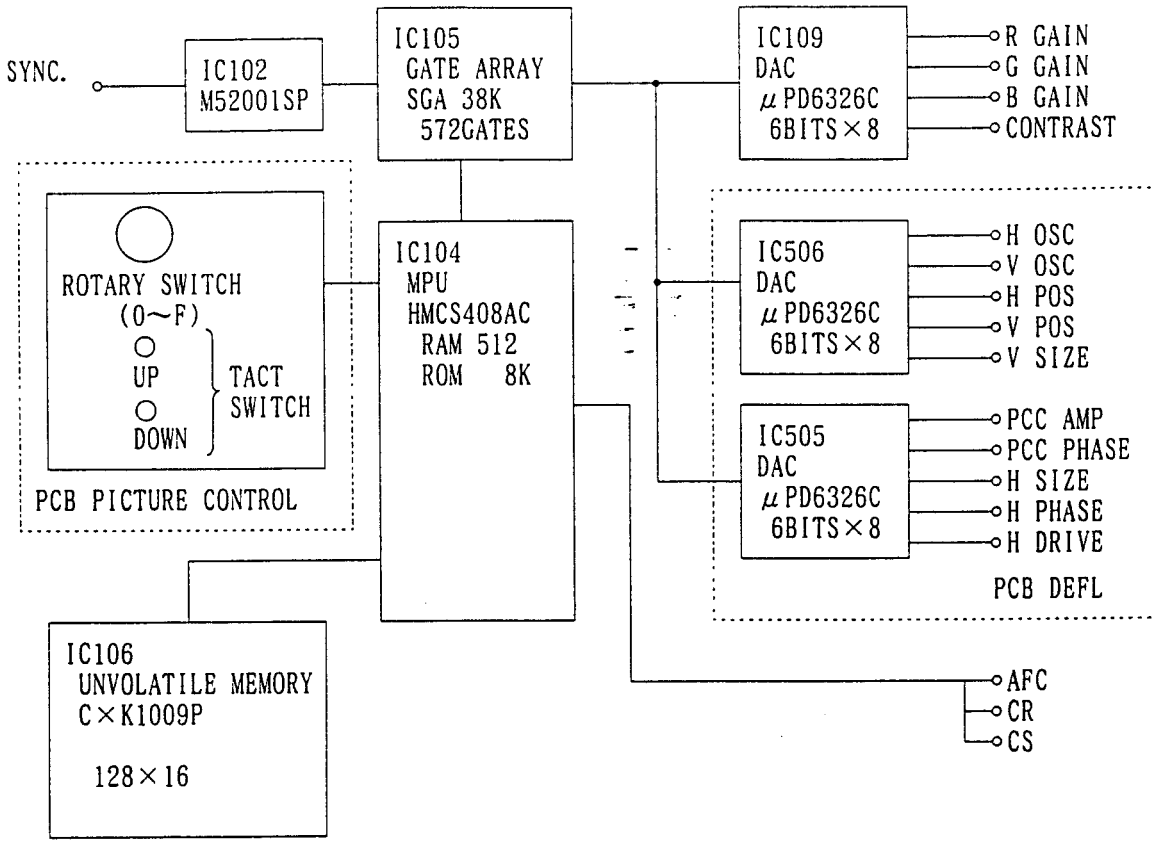


FIG 2-4-2 BLOCK DIAGRAM OF CONTROL

2) IC109, IC505 AND IC506 ARE D/A CONVERTERS, WHOSE FUNCTIONS ARE 6BIT×8CIRCUITS, AND DATA INPUT IS PERFORMED BY SEREIAL FORWARD. DATA IS SENT FROM 46PIN OF IC105 TO 2PIN OF D/A CONVERTERS, AND CLOCK SIGNAL WORKING AT SERIAL FORWARD IS INPUTTED FROM D8 PORT OF MPU.
D/A CONVERSION DATA SYNCHRONIZED TO CLOCK SIGNAL D3 PORT OF MPU IS OUTPUTTED FROM IC105, AND WHEN FINISHED DATA FORWARD, LOAD PULSE IS SENT FROM D5, DB OR DC PORT OF MPU TO D/A CONVERTER, THEN DATA IS MAINTAINED IN LATCH OF D/A CONVERTER. DC VOLTAGE FROM D/A CONVERTERES ARE USED TO CONTROL SCREEN WIDTH, POSITOON AND BRIGHTNESS.

3) IC106 IS E²PROM IN WHICH CONTROLL DATA LIKE SCREEN SIZE, POSITION, BRIGHTNESS ETC. CAN BE MEMORIZED. IT'S FUNCTION IS 128WORDS × 16BITS.
4BITS DATA ARE INPUTTED AND OUTPUTTED FROM R5 PORTS OF MPU. 4BITS DATA ARE SYNCHRONIZED BY CLK PULSE. FROM R63 PORT OF MPU, AND TRANSFORMED TO 16BITS DATA.

4) IC105 IS GATE ARRAY, WHOSE FUNCTION IS 572 GATES. IC105 HAS CLOCK GENERATER CIRCUIT, CLUMP PULSE GENERATER CIRCUIT, WDT RESET CIRCUIT, AND, D/A CONVERSION DATA PARALLEL TO SERIAL TRANSFER CIRCUIT.
BLOCK DIAGRAM IS SHOWN IN FIG 2-4-3

TABLE 2-4-1 TRUTH TABLE OF C_S, C_R, AND AFC

FH	C S				C R			AFC	
(KHz)	3	2	1	0	2	1	0	1	0
15	0	0	0	0	0	0	0	0	0
13									
17									
18		1							
19	1								1
20	1				1				
21	0	0	1						
22	0								
23	1								
24	1	1							
25	1	0	0	1		1			
26	0	1							
27	1							1	0
28	1								
29	1								
30	0	0	1						
31	0						1		
32	0								
33	1								
34	1								
35	0	1							1
36	0								
37	0								
38	1								

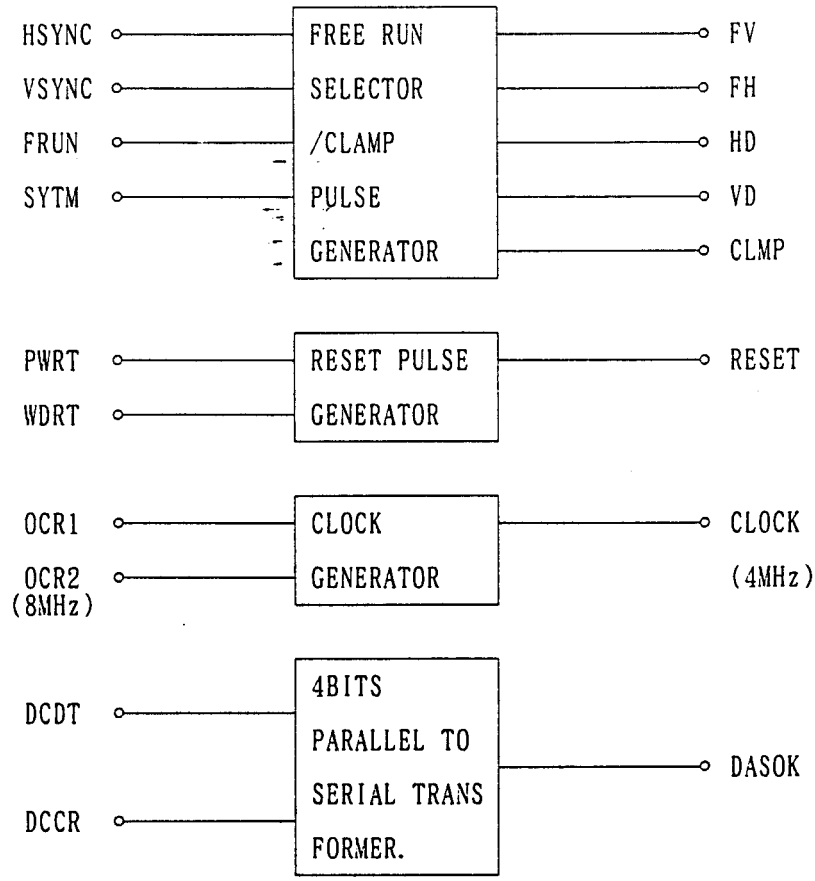


FIG 2-4-3 BLOCK D2AGRAM OF G/A

3. ADJUSTMENT PROCEDURE

THIS DISPLAY MONITOR IS ADJUSTED TO THE TIMINGS STATED IN 1.1.1) IN PRESET MODE AT FACTORY. RE-ADJUSTMENT WHEN REPAIRING OR MEMORIZING NEW TIMINGS REQUESTED FROM CUSTOMERS CAN BE ACHIEVED BY UTILIZING 1 ROTARY SWITCH, 2 TACT SWITCHES INSIDE THE SIDE PANEL AND 1 DIP SWITCH ON THE BACK SIDE OF MONITOR. REFER FIG. 3-1. SOME ITEMS LIKE HIGH VOLTAGE, CRT CUT OFF ETC. CAN BE ADJUSTED BY SEMI-FIXED POTENTIO-METERS INSIDE THE MONITOR.

POTENTIO-METERS INSIDE THE MONITOR.

3.1 PRIOR TO ADJUSTMENT

THIS MONITOR HAS 2 MEMORY AREAS, ONE IS PRESET-MODE AND THE OTHER IS NORMAL-MODE. EACH MODE CAN BE SELECTED BY CHANGING 6TH SWITCH OF 6 GANG DIP SWITCH ON THE BACK OF THE MONITOR. UPPER POSITION IS NORMAL MODE, AND LOWER POSITION IS PRESET MODE.

(1) PRESET-MODE

IN PRESET-MODE SOME SIGNAL TIMINGS STATED IN 1.1.1) ARE MEMORIZED IN FACTORY, AND THESE TIMINGS ARE PROTECTED NOT TO BE CLEARED AT USER'S MISADJUSTMENT. IN CASE OF RE-ADJUSTMENT, PROTECTION SHOULD BE RELEASED. HOW TO RELEASE THE PROTECTION ARE AS FOLLOWS.

① SET THE SERVICE SWITCH ON PCC-BOARD TO "SVCE" POSITION IN KEEPING THE POWER SWITCHED ON. SERVICE SWHICH IS SET TO "ADJ" POSITION AT DELIVERY.

② OR, SET ROTARY SWITCH INSIDE THE SIDE PANEL TO "A" POSITION, THEN TURN THE MONITOR ON. RE-SET THE ROTARY SWITCH TO "D" POSITION, AND PUSH "INCREASE" AND "DECREASE" BUTTONS IN THE SAME TIME.

<NOTE>PRESET-MODE IS THE MEMORY AREA FOR FACTORY USE. OTHER TIMINGS EXCEPT 1.1.1) MUST BE NEMORIZED IN NORMAL-MODE.

(2) NORMAL-MODE

IN NORMAL-MODE 6 DIFFERENT TIMINGS CAN BE MEMORIZED BECAUSE OF NOT TO BE PROTECTED TO E^2PROM. SOME ITEMS INDICATED "DSB" IN PARAGRAPH (3) CAN BE RE-ADJUSTED BY RELEASING THE PROTECTION.

ONE OF CONDITIONS STATED BELOW SHOULD BE SATISFIED TO MEMORIZE 6 DEFFERENT TIMINGS.

① HORIZONTAL SYNCHRONOUS-FREQUENCIES ARE SEPARATED BIGGER THAN 2KHz TO EACH OTHER.

② THE POTARITIES OF HORIZONTAL AND/OR VERTICAL ARE DEFFERENT TO EACH OTHER.

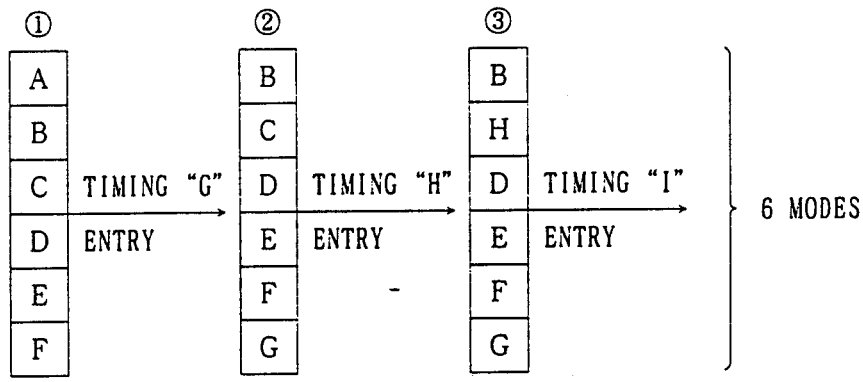
③ VERTICAL SYNCHRONOUS FREQUENCIES ARE SEPARATED BIGGER THAN THE VALUES STATED IN TABLE 3-1-1.

TABLE 3-1-1 DEVIATION OF VERTICAL FREQUENCY

45Hz ~ 55Hz	5Hz OR MORE
55Hz ~ 65Hz	7Hz OR MORE
65Hz ~ 75Hz	10Hz OR MORE
75Hz ~ 90Hz	15Hz OR MORE

<EXAMPLES>

		H-SYNC	V-SYNC	
31.5KHz	60Hz	+	+	DISTINGUISHABLE
31.5KHz	60Hz	+	−	POLARITIES OF SYNC. SIGNAL
31.5KHz	60Hz	−	+	ARE DEFFERENT.
31.5KHz	60Hz	−	−	
31.5KHz	60Hz			DISTINGUISHABLE
29.5KHz	60Hz			FREQUENCIES ARE SEPARATED
29.5KHz	50Hz			ENOUGH.



<NOTE>

① A TIMING WAS MEMORIZED AT FIRST.
F TIMING WAS MEMORIZED AT LAST.

② G TIMING WHICH CAN BE DISTINGUISHED FROM A～F CAN BE MEMORIZED PUSHING A TIMING OUT.

③ H TIMING WHICH CAN'T BE DISTINGUISHED FROM C CAN BE CHANGED WITH C TIMING.

FIG. 3-1-1 MEMORY ADDRESS

(3) ITEMS OF ADJUSTMENT

EACH ADJUSTMENT ITEM CAN BE SELECTED BY PICTURE CONTROL SWITCH LOCATED IN SIDE PANEL. REFER TO TABLE 3-1-2.

9 USER'S ADJUSTMENT ITEMS ARE INDICATED INSIDE THE SIDE PANEL, AND ALSO OTHER ITEMS CAN BE RE-ADJUSTED BY SERVICE PERSONNEL. TO MEMORY NEW IMAGES, PUSH "INCREASE" AND "DECREASE" BUTTONS IN THE SAME TIME IF NEW IMAGE DISAPPEARS AND SOON APPEARS, NEW IMAGE CAN BE MEMORIZED, IN THIS TIME THE FORMER IMAGE APPEARS, THEN NEW IMAGE CANNOT BE MEMORIZED.

TABLE 3-1-2 ITEMS OF PICTURE CONTROL SWITCH

ROTARY SWITCH POSITION	ITEM	INCREASE	NOTE
1	H-PHASE	RIGHT	
2	H-SIZE	LARGE	
3	H-POSI.	RIGHT	
4	V-POSI.	HIGH	
5	V-SIZE	LARGE	
6	V-SIZE. FINE	LARGE	
7	CONTRAST	DEEP	
8	PCC-AMP	BARREL	
9	PCC-PHASE	UP BARREL	
A	R-DRIVE	DEEP	DSB
B	G-DRIVE	DEEP	DSB
C	B-DRIVE	DEEP	DSB
E	VOSC	HIGH FREQUENCY	DSB
F	CONTRAST VR	DEEP	

< NOTE >

1) IN NORMAL-MODE ITEMS EXCEPT "DSB" CAN BE MEMORIZED WHETHER RELEASING THE PROTECTION OR NOT. IN PRESET-MODE RELEASING THE PROTECTION IS NEEDED TO MEMORIZE ALL ITEMS.
2) 7TH'S "CONTRAST" IS PROVIDED TO ADJUST CONTRAST FINELY BY USER. SET TO THE APPROPRIATE BRIGHTNESS NOT TO APPEAR THE DOMING, IN PRESET-MODE ,

THIS ITEM HAS NOT TO BE RE-ADJUSTED ABSOLUTELY TO AVOID CHANGING THE COMPENSATION FACTOR WHICH COMPENSATES THE CONTRAST IN RELATION TO DEFLECTION FREQUENCIES.

WHEN ADJUSTING THE CONTRAST, ADJUST R, G, B-DRIVE.

3) F'S "CONTRAST" OPERATES SAME AS FRONT CONTRAST POTENTIO-METER. NORMALLY PUSH "INCLEASE" AND "DECLEASE" BUTTONS TO GET MAXIMUS BRIGHTNESS AND SET THE FRONT CONTRAST TO APPROPRIATE BRIGHTNESS.

3.2 INTERNAL ADJUSTMENT

It is not necessary to release the protection of E²PROM when adjust the potentiometer on PCB.

In normally, standard position of switches are as follows.

MODE SWITCH	:	PRESET (on the rear panel)
SERVICE SWITCH	:	ADJ (on PCB-PCC)
VIDEO SELECTION SWITCH	:	ANALOG
PICTURE CONTROL SWITCH	:	F (in the side panel)

[ ] : Timing

1) HORIZONTAL FREE RUNNING FREQUENCY ADJUSTMENT

(1) Connect the frequency counter between red lead of DY and chassis GND by loose coupling.
(2) Set SW201 on PCB-VIDEO to F/R position.
(3) Receive 37.4KHz sync. signal, then adjust the horizontal free running frequency to 37.4 ± 0.2KHz by VR505. [VGAP]
(4) Receive 15.7KHz sync. signal, then adjust the horizontal free running frequency to 15.7 ± 0.2KHz by VR501. [CGA]
(5) After that, check 37.4KHz horizontal frequency then if necessary, readjust the adjustment procedure of item (3) and (4).
(6) Set SW201 to center position.

2) VERTICAL FREE RUNNING FREQUENCY ADJUSTMENT

(1) Connect the frequency counter between pin of vertiacal coil on DY and chassis GND.
(2) Set SW201 to F/R position.
(3) Set the PICTURE CONTROL switch in the side panel to "E" position.
(4) Receive 45Hz vertical sync. signal, then adjust the vertical free running frequency to 39 ± 2Hz by INCREASE or DECREASE switches in the side panel.(①,② of Fig. 3-1) [TEST45]
(5) Push the both switches of INCREASE and DECREASE for the data entry to E_2PROM.
(6) Receive 95Hz vertical sync. signal, then adjust the vertical free running frequency to 85 ± 2Hz by INCREASE or DECREASE switches in the side panel.(①,② of Fig. 3-1) [TEST95]
(7) Push the both switches of INCREASE and DECREASE for the data entry to E²PROM.
(8) Set SW201 to center position.

3) HIGH VOLTAGE ADJUSTMENT [VGA400]

(1) Connect the high voltmeter(full scale bigger than 35KV) between CRT anode and chassis GND.

(2) Adjust the anode voltage to 30±0.3KV by HV-ADJ control(VR503) on the PCB DEFL.

(3) Turn slowly HV-Limit control(VR504) to obtain the shut doun point of high voltage.

(4) After that, turn off the monitor then set HV-ADJ control(VR503) to minimum position.

(5) Turn on the monitor then to adjust the high voltage for a 27±0.3 KV by VR503.

> CAUTION
> HV-ADJ(VR503) and HV-Limit(VR504) controls are sealed and no field serviceable parts to avoid exposure of X-Ray. Please contact to qualified personnel of Mistubishi, if necessary to re-adjust.

4) SCREEN VOLTAGE ADJUSTMENT [VGA400]

(1) Connect the high voltmeter between ⑦pin of CRT socket and chassis GND.

(2) Adjust the screen voltage for a 570±10V by screen control on FBT.

> CAUTION
> Screen control of FBT is also sealed by adhesive.
> Please contact to qualified personnel of Mitsubishi, if necessary to re-adjust.

5) HORIZONTAL DRIVE ADJUSTMANT [VGA400]

(1) Connect the voltmeter between positive side of C967 on the PCB POWER and chassis GND.

(2) Adjust H-DRIVE control(VR502) on the PCB DEFL to obtain the minimum voltage reading on the voltmeter.

6) CRT CUT-OFF ADJUSTMENT [VGA400]

(1) Set the Contrast and Brightness controls on the front panel to maximum position.
(2) Turn the cut-off control-of VR6R1,6G1 and 6B1 on the PCB CRT to their minimum position.
(3) Receive only sync. signal.(No video)
(4) Adjust G1-ADJ control(VR601) on the PCB CRT to obtain dimly raster on the screen.
(5) Adjust VR6R1,6G1 and 6B1 on the PCB CRT then to obtain the white raster on the screen.
(6) Adjust G1-ADJ control(VR601) to obtain approx. 1nit luminance.

7) BRIGHTNESS AND WHITE BALANCE ADJUSTMENT [VGA400]

(1) Turn the Contrast and Brightness controls on the front panel to maximum position.
(2) Receive the approx. 80×80mm green window pattern video signal on the center of screen.
(3) Select "B" position of PICTURE CONTROL switch in the side lid cover then adjust green color luminance to 75nits(B22)/40nits(BL9) by INCREASE or DECREASE switch.
(4) Receive the approx. 80×80mm white window pattern and select "A (R-DRIVE)" or "C(B-DRIVE)" position of PICTURE CONTROL switch in the side lid cover then to adjust white balance for X=0.283±0.01 and Y=0.297±0.01 by INCREASE or DECREASE switch.
(5) After above adjustment, push the switches of INCREASE and DECREASE for the data entry.

3.3 SCREEN IMAGE ADJUSTMENT

The screen image adjustment is selectable by rotary switch in the side lid panel on item by item which is necessary to release the protection of E_2PROM at preset mode, and not necessary to release the protection of E_2PROM at normal mode.

1) H-PHASE ADJUSTMENT

(1) Select "1" position of PICTURE CONTROL switch in the side cover.
(2) It is available to adjust the horizontal phase by INCREASE or DECREASE switch.

2) H-SIZE ADJUSTMENT

(1) Select "2" position of PICTURE CONTROL switch in the side cover.

(2) It is available to adjust the hrizontal width by INCREASE or DECREASE switch.

3) H-POSITION ADJUSTMENT

(1) Select "3" position of PICTURE CONTROL switch in the side cover.

(2) It is available to adjust the horizontal raster position by INCREASE or DECREASE switch.

4) V-POSITION ADJUSTMENT

(1) Select "4" position of PICTURE CONTROL switch in the side cover.

(2) It is available to adjust the vertical raster position by INCREASE or DECREASE switch.

5) V-SIZE ADJUSTMENT

(1) Select "5" position of PICTURE CONTROL switch in the side cover.

(2) It is available to adjust the vertical raster height by INCREASE or DECREASE switch.

6) V-SIZE-FINE ADJUSTMENT

(1) Select "6" position of PICTURE CONTROL switch in the side cover.

(2) It is available to controll the vertiacal raster height by INCREASE or DECREASE switch.

7) CONTRAST ADJUSTMENT

(1) Select "7" position of PICTURE CONTROL switch in the side cover.

(2) It is available to adjust the contrast of screen by INCREASE or DECREASE switch.

8) PCC-AMP ADJUSTMENT

(1) Select "8" position of PICTURE CONTROL switch in the side cover.

(2) It is available to correct the pincushion or barrel distortion of screen by INCREASE or DECREASE switch.

9) PCC PHASE ADJUSTMENT

(1) Select "9" position of PICTURE CONTROL switch in the side cover.

(2) It is available to correct the trapezoidal or keystone distortion by INCREASE or DECREASE switch.

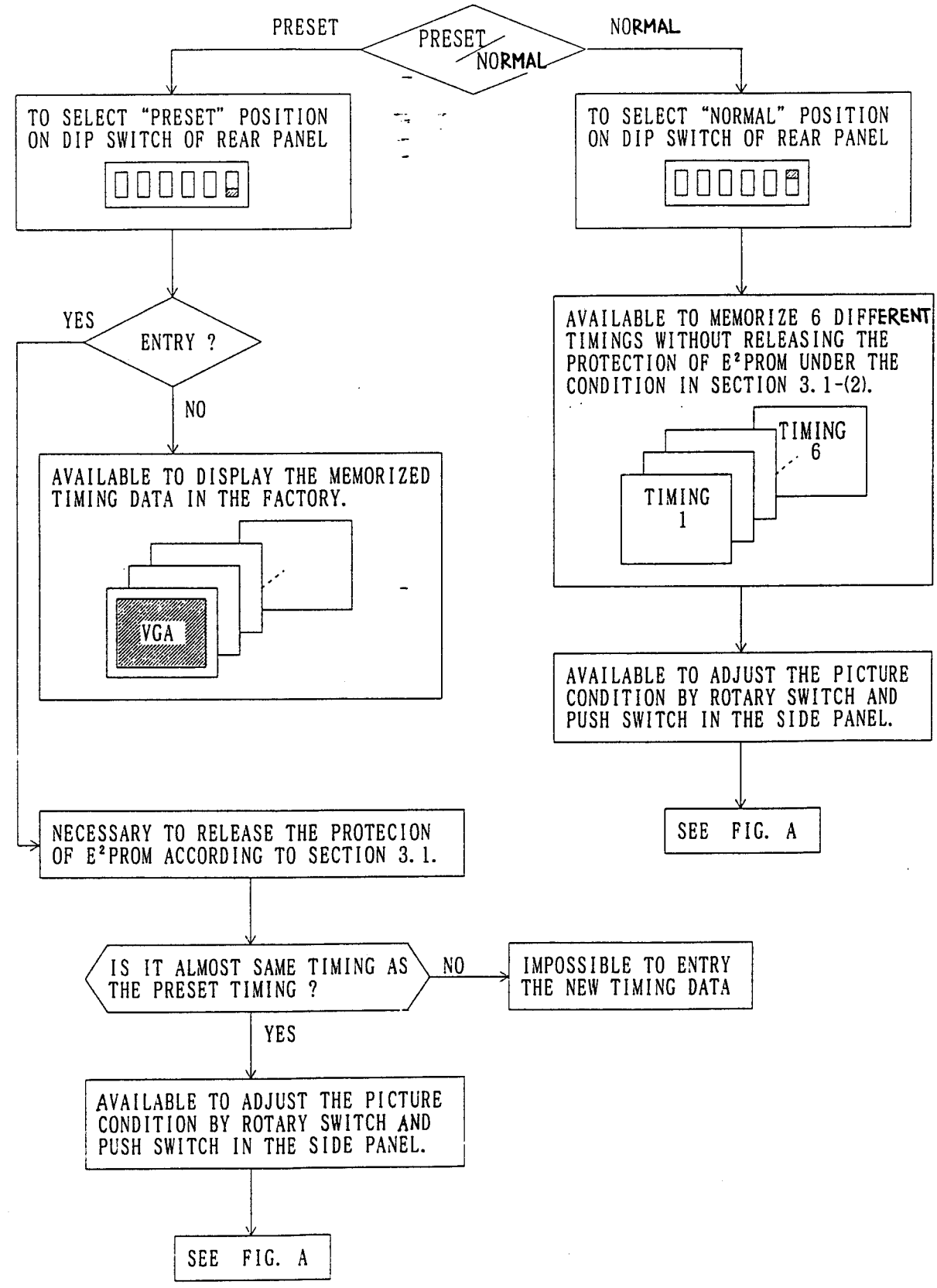
10) MEMORY PROTECT

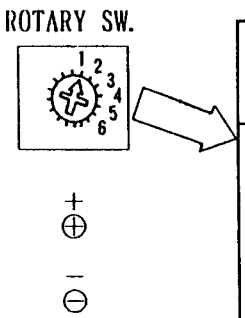
It is necessary to protect the E^2PROM after these adjustment which method is as follows.

(1) Set the SVCE switch on PCB PCC to ADJ position.
(In case of section 3.1.(1) ①)

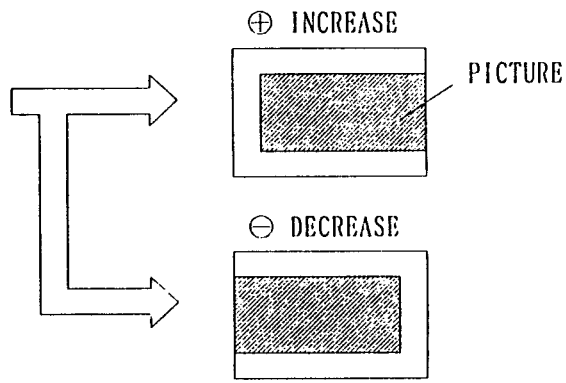
(2) Turn off the power switch for the protection.
(In case of section 3.1.(1) ②)

3.4 HOW TO ADJUST SCREEN PICTURES ?


PRESET
PRESET
NORMAL
NORMAL
TO SELECT "PRESET" POSITION ON DIP SWITCH OF REAR PANEL
TO SELECT "NORMAL" POSITION ON DIP SWITCH OF REAR PANEL
YES
ENTRY ?
NO
AVAILABLE TO DISPLAY THE MEMORIZED TIMING DATA IN THE FACTORY.
VGA
AVAILABLE TO MEMORIZE 6 DIFFERENT TIMINGS WITHOUT RELEASING THE PROTECTION OF E²PROM UNDER THE CONDITION IN SECTION 3.1-(2).
TIMING 6
TIMING 1
AVAILABLE TO ADJUST THE PICTURE CONDITION BY ROTARY SWITCH AND PUSH SWITCH IN THE SIDE PANEL.
SEE FIG. A
NECESSARY TO RELEASE THE PROTECION OF E²PROM ACCORDING TO SECTION 3.1.
IS IT ALMOST SAME TIMING AS THE PRESET TIMING ?
NO
IMPOSSIBLE TO ENTRY THE NEW TIMING DATA
YES
AVAILABLE TO ADJUST THE PICTURE CONDITION BY ROTARY SWITCH AND PUSH SWITCH IN THE SIDE PANEL.
SEE FIG. A

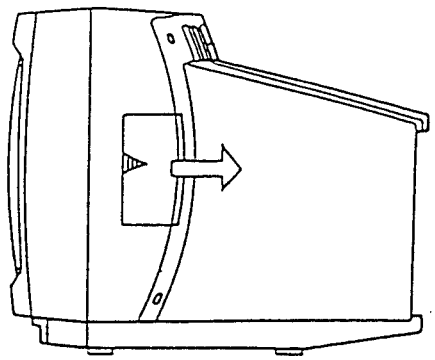


SW. POSITION	ITEM	EFFECT OF PUSH SW. ⊕	EFFECT OF PUSH SW. ⊖	PROTECT / NOT PROTECT
1	H-PHASE	RIGHT	LEFT	NOT PROTECT
2	H-SIZE	LARGE	SMALL	NOT PROTECT
3	H-POSI	RIGHT	LEFT	NOT PROTECT
4	V-POSI	HIGH	LOW	NOT PROTECT
5	V-SIZE	LARGE	SMALL	NOT PROTECT
6	V-SIZE-FINE	LARGE	SMALL	NOT PROTECT
7	CONTRAST	DEEP	LIGHT	NOT PROTECT
8	PCC-AMP	BARREL	PIN	NOT PROTECT
9	PCC-PHASE	UP BARREL	DOWN BARREL	NOT PROTECT
A	R-DRIVE	BRIGHT	DARK	▶ PROTECT ◀
B	G-DRIVE	BRIGHT	DARK	▶ PROTECT ◀
C	B-DRIVE	BRIGHT	DARK	▶ PROTECT ◀
D	(SPARE)			
E	V-OSC	HIGH	LOW	▶ PROTECT ◀
F	OPERATE	DEEP	LIGHT	NOT PROTECT
0	BRIGHT	BRIGHT	DARK	NOT PROTECT

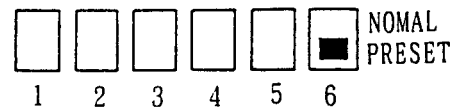


※ IT IS NECESSARY TO RELEASE THE PROTECTION OF E²PROM
ABOUT POSITION OF A, B, C AND E.

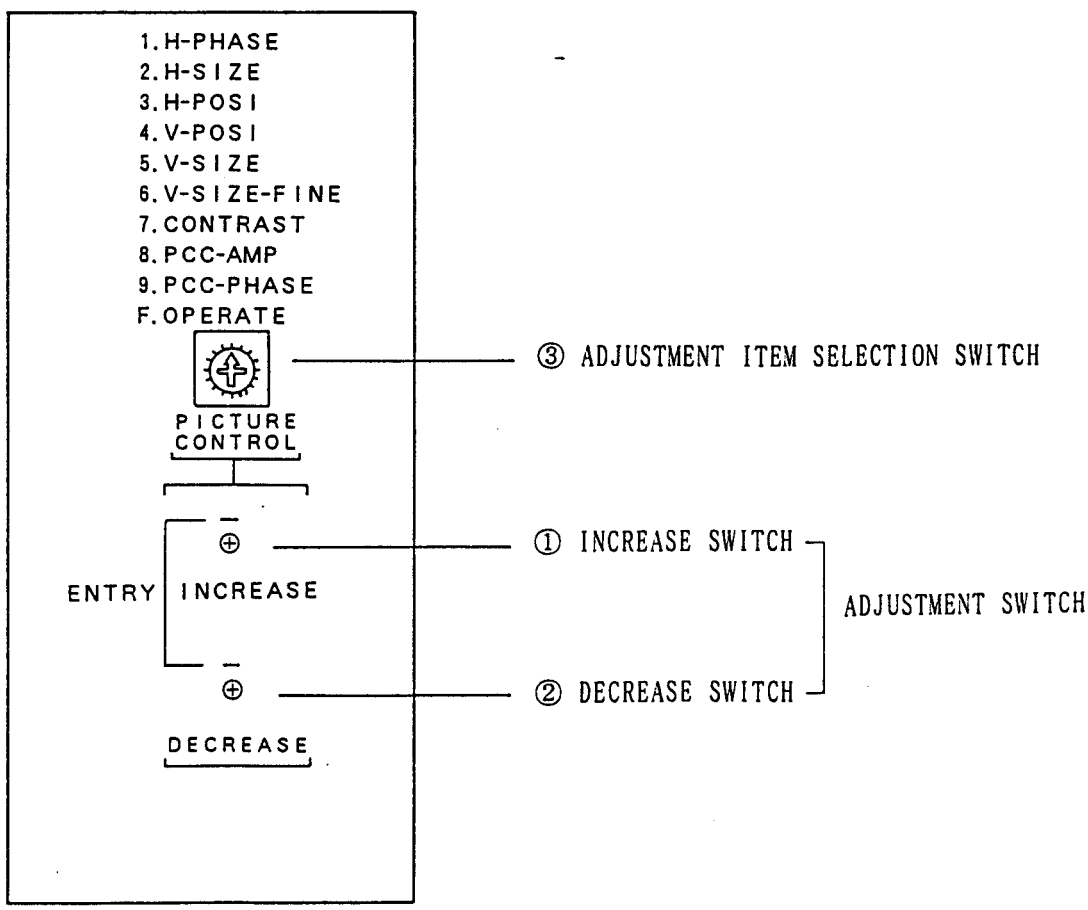
FIG. A PICTURE CONTROL TABLE



DIP SWITCH

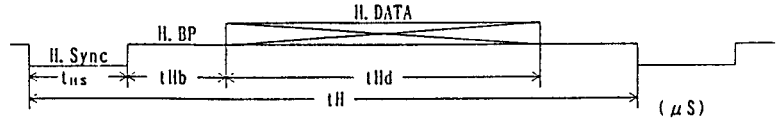


Picture Control Panel

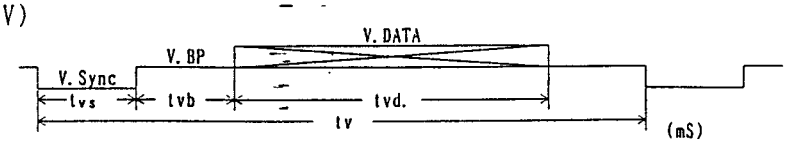


3.5 TIMING CHART

(1) HORIZONTAL (1H)



(2) VERTICAL (1V)



(3)

SIGNAL TYPE				
VIDEO	A;ANALOG T;TTL G;ANALOG with sync Sync on Green M;MONOCHROME -64, -16, -8			
HD	P;POS. N;NEG	C;COMPOSITE SYNC. AND NO SERRATION	S;COMPOSITE SYNC WITH NEGATIVE SERRATION	E;COMPOSITE SYNC WITH EQUIVALENT PULSE
VD	P;POS. N;NEG			

TIMING CHART DATA TABLE

Video { T : TTL; AG: ANAROG VIDEO WITH SYNC.; A : ANALOG VIDEO; M : MONOCHROM }

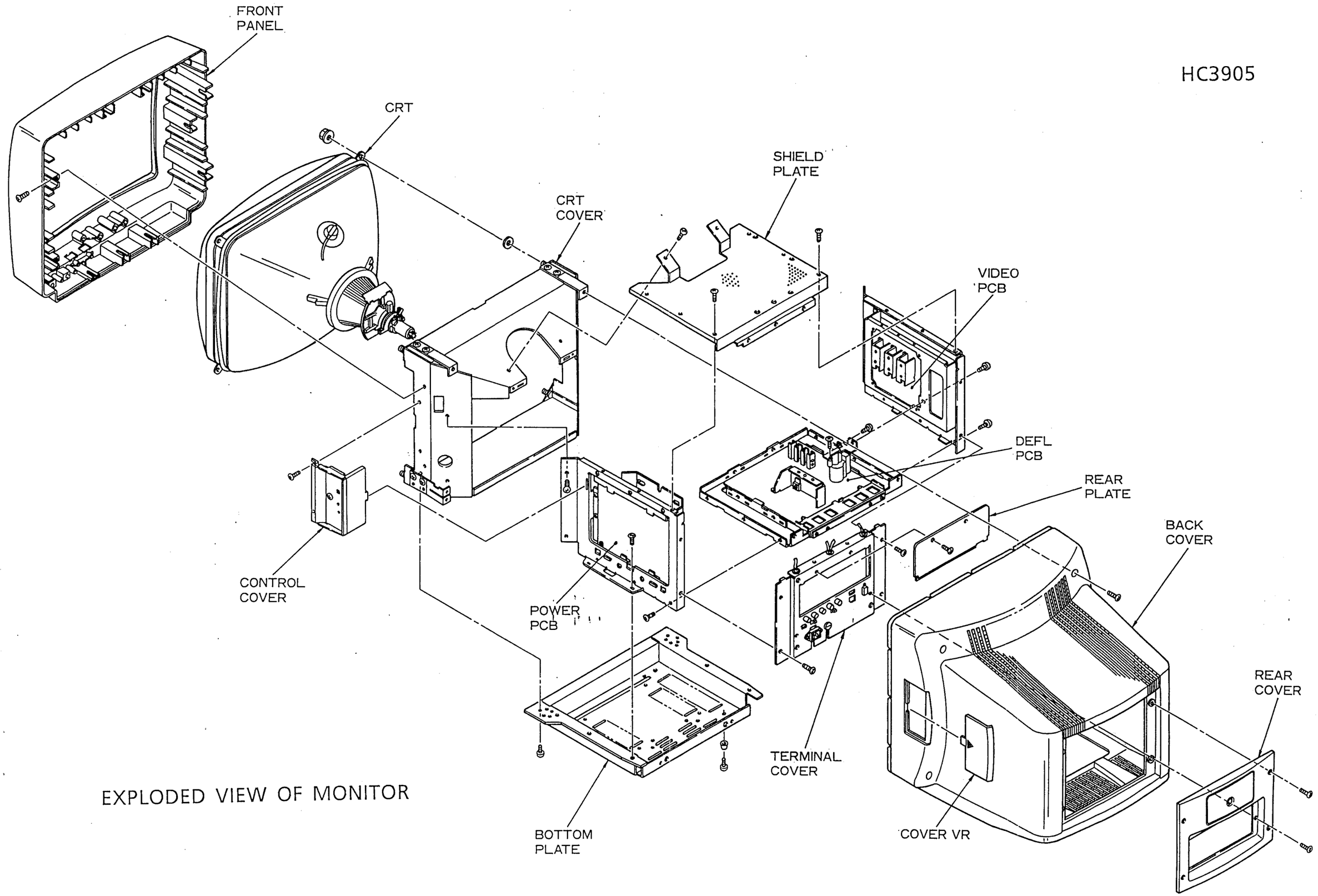
No.	dot in t_{HD}	t_H	t_{Hs}	t_{Hb}	t_{Hd}	t_V	t_{Vs}	t_{Vb}	t_{Vd}	Video	I/NI	H_{Sync}	V_{Sync}	REMARKS
1														
2	640	63.50	4.500	8.100	44.66	16.637	0.191	2.159	12.70	T-16	NI	P	P	CGA(BORDER)
3	640	63.50	4.500	4.500	52.30	16.64	0.190	0.762	15.62	T-16	NI	P	P	CGA
4	640	45.76	4.620	2.060	39.08	16.84	0.595	0.137	16.016	T-64	NI	P	N	BGA(CH.)
5	640	59.154	3.70	4.93	49.292	14.405	0.180	0.770	13.25	AG-1	I	—	—	OEM
6	640	31.70	2.20	2.80	25.50	16.67	0.095	0.697	15.818	AG-1	NI	—	—	OEM
7	640	31.780	3.800	1.960	25.420	16.685	-0.064	1.017	15.254	A-1	NI	N	N	VGA480
8	720	31.780	3.800	1.900	25.480	14.269	0.064	1.081	12.712	A-1	NI	N	P	VGA400
9	738	31.778	3.813	1.589	26.058	14.268	0.064	0.889	13.156	A-1	NI	N	P	VGA400(TEXT)
10	720	31.780	3.800	1.960	25.420	14.269	0.064	1.875	11.127	A-1	NI	P	N	VGA350
11	1024	28.150	3.920	1.420	22.80	11.485	0.112	0.563	10.810	A-1	I	P	P	8514A
12	720	54.25	8.30	1.11	44.29	20.07	0.868	0.217	18.99	T-M	NI	P	N	MDA
13	640	28.560	2.120	3.320	21.18	14.994	0.086	1.114	13.709	AG-2	NI	C	—	MACH
14	1120	30.432	1.67	3.01	23.41	12.50	0.152	0.56	11.69	A-1	I	N	P	OEM
15														
16														
17	640	40.28	3.04	4.04	30.40	18.045	0.322	1.168	16.112	A-1	NI	N	N	PC9801
18	640	40.28	3.04	4.04	30.40	18.045	0.322	1.168	16.112	T-8	NI	N	N	PC9801
19	1120	30.44	1.76	2.72	23.42	12.633	0.152	0.822	11.415	A-1	I	N	N	PC98XA
20														
21	800	26.72	2.30	2.98	21.04	16.647	0.374	0.214	16.032	A-1	NI	P	P	VGAP
22	1120	27.44	2.00	2.80	22.44	11.141	0.439	0.412	10.263	A-1	I	N	N	FMR70
23	640	33.05	2.86	3.83	25.42	16.558	0.397	0.165	15.864	T-64	NI	P	N	JEGA
24	640	31.78	3.80	1.90	25.48	22.246	0.064	2.924	15.954	A-1	NI	N	P	TEST45
25	640	31.78	3.80	1.90	25.48	10.519	0.064	0.381	10.011	A-1	NI	N	P	TEST95

PRESET TABLE (ON) STANDARD MODEL

○ ; COARSE ADJUSTMENT
⊘ ; ONLY CONFIRMATION FOR C_S and C_R
◎ ; FINE ADJUSTMENT

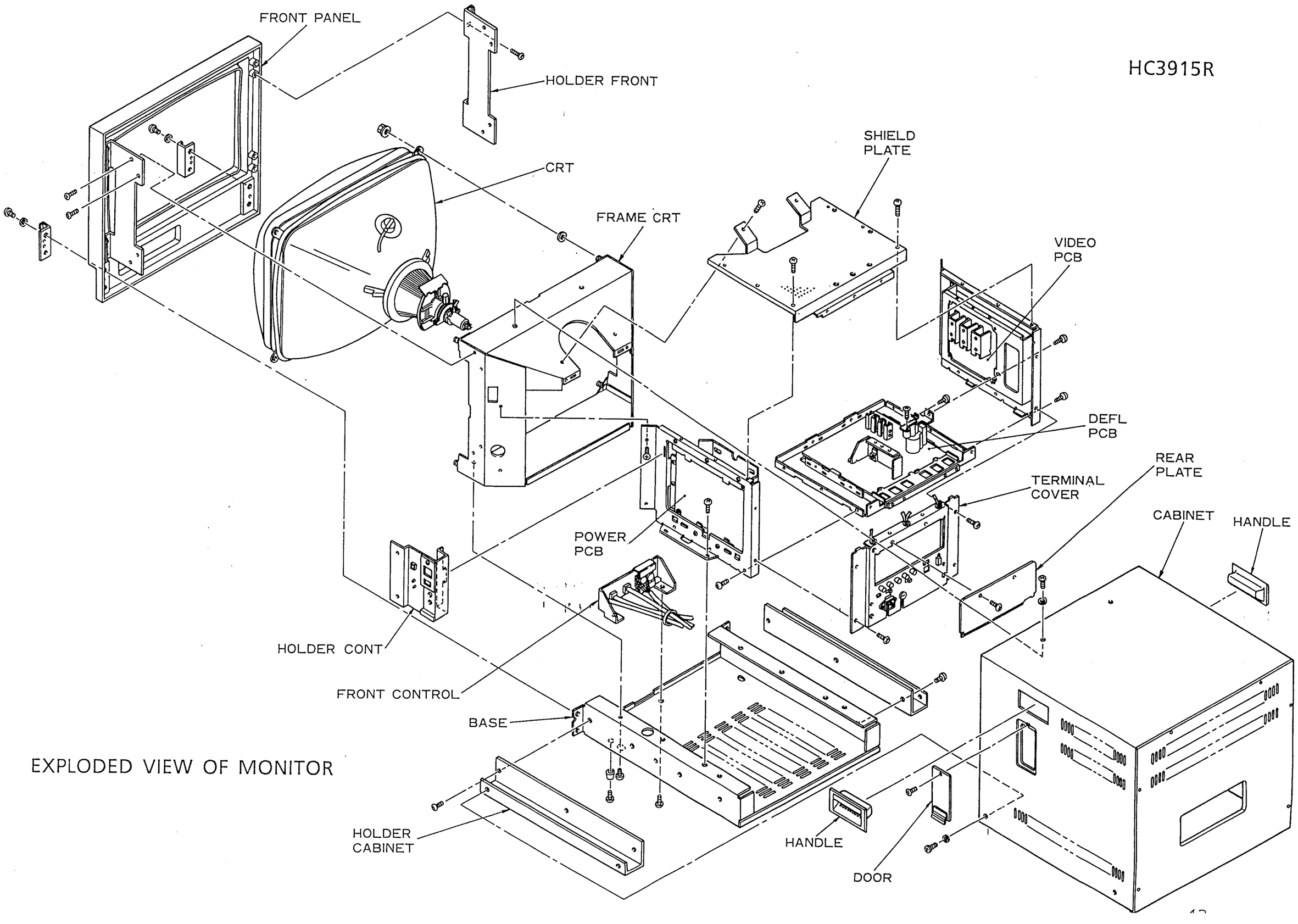
SIGNAL	FH/FV	K/KE KV	R/RE RV	WEX	PEX	RJ	RASTER SIZE (H×V)mm	TTL/ANA
CGA	15.7K/60	○⊘	○⊘	○⊘	○⊘	○⊘	325×246	TTL 16
EGA	21.8K/60	◎	○		◎		350×265	TTL 64
PC98RA	24.8K/55			◎	◎	○	350×220	ANA
JEGA	30.5K/60				◎	○	350×265	TTL 64
VGA350	31.5K/70	◎	○			○	350×265	ANA
VGA400	31.5K/70	◎	◎			◎	350×265	ANA
VGA480	31.5K/60	◎	○			○	350×265	ANA
PC98RL	32.8K/80			◎	○	○	350×220	ANA
MACH	35.0K/66	◎			◎	○	350×265	ANA
8514A	35.5K/87	◎	○				350×264	ANA
FMR70	36.8K/89						350×235	ANA
VGAP	37.4K/60	◎	○⊘			○⊘	350×265	ANA

HC3905

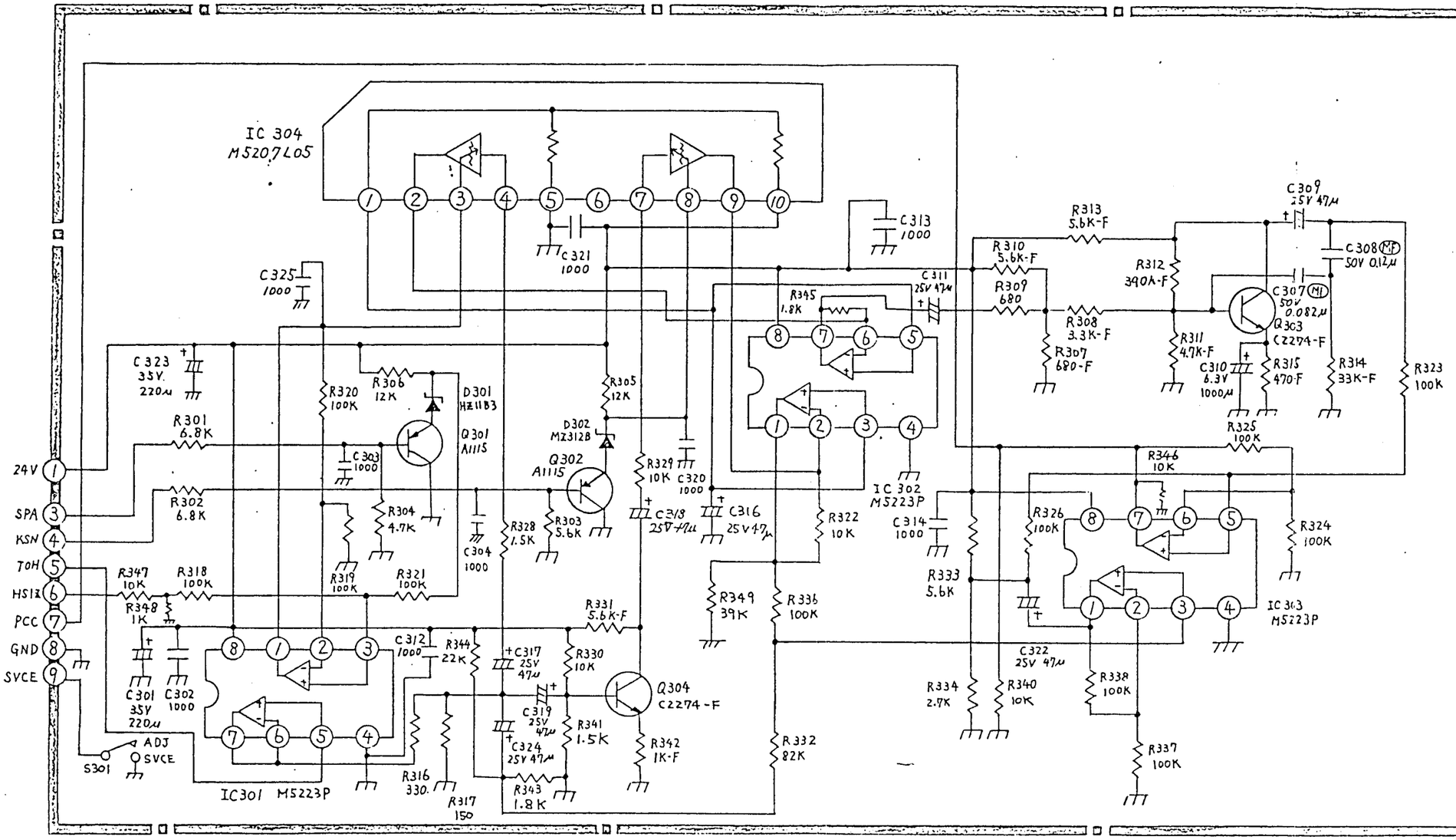


EXPLODED VIEW OF MONITOR

HC3915R



EXPLODED VIEW OF MONITOR



(1) 見本部品調達試験規格
適用スル
THE PARTS MUST SATISFY THE FOLLOWING STANDARD OF SPEC NO ITEM

(2) 量産前ニ見本ヲ、個 ショット担当技術課ニ提出シ了解ヲ得タ後量産ニ入ル
SAMPLES SHALL BE SUBMITTED TO ENG DEPT FOR TECHNICAL APPROVAL BEFORE PRODUCTION STARTS

(3) 打抜キカエリハ材厚内ノコト
BURR: 1/5 × THICKNESS MAX

(4) 指定ナキ打抜キ角ハR1～R3トスル
CORNERS ACCEPTABLE AT R1~3 UNLESS OTHERWISE SPECIFIED

(5) 指示ノナイ寸法許容差ハ右表ヲ適用スル
TOLERANCE MUST BE IN ACCORDANCE WITH THE TABLE RIGHT HAND UNLESS OTHERWISE SPECIFIED

呼ビ寸法 RANGE OF DIMENSION	寸法差 ALLOWABLE TOLERANCE 鉄金 SHEET METAL	樹脂品 PLASTIC	木工品 WOOD EN	紙製品 PAPER ETC.
UP TO 30	±0.5	±0.2	±1.0	±2.0
ABOVE 30 TO 60	±0.7	±0.3		
ABOVE 60 TO 120		±0.5	±1.5	±3.0
ABOVE 120 TO 250	±1.0	±0.7		
ABOVE 250 TO 500	±1.5	±1.0	±2.0	±4.5
ABOVE 500		±1.5	±2.5	±5.0

板金ノ曲ゲ角度ノ寸法差±1 75/100 (1度)
ANGLE: SHEET METAL ±1 75/100 (1DEG)

品番 ITEM	件名 APPLICABLE MODEL NO.
1	HC3905

改変 CHANGE MARK	32 副番 REV NO.	33 品番 ITEM	規格 MATERIAL AND DIMENSION	(MI) MARK	UNIT CODE	改正通知番号	改定切替月日	摘要 REMARK
b	A	1	HC3905 PCC		50			

改定 CHANGE
(a) (C-3) 元 D301 ハ MZ310-C1 デアッタ
(a) (C-4) R349 ヲ追加ニシ CR997C205 89-9-6 カイテイ
(b) (4-D) 元 R341 ハ1.2K-F デアッタ
(b) (3-D) ヲ R343, 1.8K-F デアッタ CR997C393 90-6-1 カイテイ

出図先 ( )
控
基結

DIM. IN mm
尺度 SCALE
NTS

MITSUBISHI ELECTRIC CORPORATION

作成日付 DATE	—	—	検認 APPROVED
作成 DRAWN			
照査 CHECKED			
設計 DESIGNED			

PCC CIRCUIT
TITLE (5~22)
SCHEMATIC DIAGRAM
DWG. No. (23~31)
PAGE 1/1

47 11

REVISION SHEET

MODEL NO. : HC3905 / HC3915R

REV.	DATE	CONTENTS
A	JUL. 5th, 1990	· ADJUSTMENT SECTION REVISED.
B	APR. 23th, 1991	· SPECIFICATION SECTION REVISED.

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: HC3905ATKV / HC3915R

1~5000SETS BASE

MITSUBISHI ELECTRIC CORPORATION
MAR 15 1990
NAGASAKI WORKS

ISSUED : MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
1		PICTURE TUBE	MODEL : HC3905ATKV	AT20A9SPB22—A—TC146
2	Q952	TRANSISTOR	2SA1021—O	CP260P04101
3	Q951	TRANSISTOR	2SC3310	CP260P04302
4	Q601	TRANSISTOR	2SA1207S	CP260P07002
5	Q526, 953, 954	TRANSISTOR	2SC3332—S	CP260P07302
6	Q531, 532, 533	FET	IRF634	CP260P07801
	Q534	FET	IRF634	CP260P07801
7	Q1R1, 1G1, 1B1	FET	2SK360—E (CHIP)	CP260P09102
8	Q2R2, 2G2, 2B2	FET	2SK656	CP260P09301
9	Q103, 104, 105	TRANSISTOR	2SC2412K—R	CP260P11001
10	Q102	TRANSISTOR	2SA1037K—R	CP260P11401
11	Q907	FET	2SK611	CP260P11801
12	Q591	TRANSISTOR	2SC3897—CA	CP260P12601
13	Q594	TRANSISTOR	2SC4123—CA	CP260P50603
14	Q905	TRIAC	TM1661S—L	CP261P02102
15	Q502, 525	TRANSISTOR	2SA1115—E, F	QX260C25601
16	Q301, 302, 501	TRANSISTOR	2SA1115—F	QX260C25604

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
	Q516	TRANSISTOR	2SA1115−F	QX260C25604
17	Q201, 202, 401	TRANSISTOR	2SC2603−E, F	QX260C33804
	Q402, 405, 503	TRANSISTOR	2SC2603−E, F	QX260C33804
	Q504, 505, 508	TRANSISTOR	2SC2603−E, F	QX260C33804
	Q509, 524, 527	TRANSISTOR	2SC2603−E, F	QX260C33804
	Q528	TRANSISTOR	2SC2603−E, F	QX260C33804
18	Q521, 522	TRANSISTOR	2SC2603−G	QX260C33805
19	Q303, 304, 906	TRANSISTOR	2SC2274−F	QX260C41603
20	Q507, 510	TRANSISTOR	2SC2229−Y	QX260P38502
21	Q512, 519	TRANSISTOR	2SC1749C, D / 2SC1749E	RX260P35202
22	Q511, 520	TRANSISTOR	2SC2317	RX270P51201
23	Q2R1, 2G1, 2B1	TRANSISTOR	2SC2347	RX270P52301
24	Q403, 592, 597	TRANSISTOR	2SD1138−C	RX270P52901
25	Q404, 596	TRANSISTOR	2SB861−C	RX270P53001
26	Q506, 517	FET	2SK358	RX270P54901
27	Q593, 595	TRANSISTOR	2SD921	RX270P55901
28	Q515	TRANSISTOR	2SC2570A	RX270P56901
29	Q904	TRANSISTOR	2SC3676	RX270P60601
30	IC201	INTEGRATED CIRCUIT	M51387P	CP263P00601

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO. : HC3905ATKV
1~5000SETS BASE

ISSUED : MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
31	IC503	INTEGRATED CIRCUIT	TC4052BP / MC14052BCP	CP263P02003
32	IC301, 302, 303	INTEGRATED CIRCUIT	M5223P	CP263P02201
	IC502, 504	INTEGRATED CIRCUIT	M5223P	CP263P02201
33	IC304	INTEGRATED CIRCUIT	M5207L05	CP263P02601
34	IC102	INTEGRATED CIRCUIT	M52001	CP263P02701
35	IC103	INTEGRATED CIRCUIT	NJM2904M	CP263P03201
36	IC501	INTEGRATED CIRCUIT	LA7852	CP266P01401
37	IC952	INTEGRATED CIRCUIT	MPC7805HF / L7805ML	CP266P05001
38	IC953	INTEGRATED CIRCUIT	MPC7824HF / L7824ML	CP266P05006
39	IC505, 506	INTEGRATED CIRCUIT	MPD6326C	CP266P06101
40	IC108	INTEGRATED CIRCUIT	PST−520C	CP266P06201
41	IC507	INTEGRATED CIRCUIT	M54523P / ULN2003AN	CP266P08103
42	IC104 New	INTEGRATED CIRCUIT	HD614089FB05	CP266P08202
43	IC107	INTEGRATED CIRCUIT	MC14013BF / HD14013BFPTC4013BF	CP266P09101
44	IC951	INTEGRATED CIRCUIT	S1−3122V	CP267P00401
45	IC101	INTEGRATED CIRCUIT	CLA−164TM	CP267P01601
46	IC2R1, 2G1, 2B1	INTEGRATED CIRCUIT	VPA05	CP267P02001
47	IC901	INTEGRATED CIRCUIT	HIC81145A	CP267P02202
48	IC991	INTEGRATED CIRCUIT	HIC STR−S5841	CP267P02301
49	IC105	INTEGRATED CIRCUIT	SGA−38K	CP267P02401

ITEM	SYMBOL No.	DESCRIPTION/SPECIFICATION		PARTS No.
50	IC6R1, 6G1, 6B1	INTEGRATED CIRCUIT	HA17431P	CP267P02501
51	IC401	INTEGRATED CIRCUIT	TDA1670	RX277P61801
52	D1R3, 1G3, 1B3	DIODE	MA170-FD/MA150-FD	CP264D00101
	D1R4, 1G4, 1B4	DIODE	MA170-FD/MA150-FD	CP264D00101
	D1R5, 1G5, 1B5	DIODE	MA170-FD/MA150-FD	CP264D00101
53	D102, 103, 104	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D105, 106, 107	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D108, 109, 110	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D111, 112, 113	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D114, 115, 116	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D117, 118, 119	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D120, 121, 122	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D123, 124, 125	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D126, 1R1, 1G1	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D1B1, 1R2, 1G2	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
	D1B2	DIODE	HZK11 TRLLD (CHIP)	CP264D00201
54	D536, 905, 957	DIODE	EU1Z	CP264P00902
	D958	DIODE	EU1Z	CP264P00902
55	D951, 952, 954	DIODE	RU3AM	CP264P01502

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
	D959	DIODE	RU3AM	CP264P01502
56	D908, 944	DIODE	RU2B	CP264P01602
57	D967	DIODE	R2KN	CP264P05501
58	D545, 591	DIODE	RS−4FS	CP264P05601
59	D953, 955	DIODE	RU−4AM	CP264P06002
60	D530	DIODE	HZ3B2	CP264P07105
61	D515	DIODE	HZ4B2	CPP264P07204
62	D525	DIODE	HZ5C1	CP264P07305
63	D956	DIODE	HZ6C1	CP264P07404
64	D524	DIODE	HZ7B2	CP264P07501
65	D301, 539	DIODE	HZ11B3	CP264P08006
66	D527, 528, 529	DIODE	HZ33−2	CP264P08404
67	D2R2, 2G2, 2B2	DIODE	DS462	CP264P09601
	D2R3, 2G3, 2B3	DIODE	DS462	CP264P09601
68	D127	DIODE	HZK6BTR LLD (CHIP)	CP264P10204
69	D901	DIODE	RBV−608	CP264P12302
70	D914, 915	DIODE	R4KL	CP264P12701
71	D902	DIODE	PZ−127	CP264P50501
72	D909	DIODE	TVR1G / ES−1	QX264D05601
73	D401, 402	DIODE	S5500−D / EM−1Z	QX264D05602

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO. : HC3905ATKV
1~5000SETS BASE

ISSUED : MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
74	D403, 404, 405	DIODE	1S2076A / 1S2471	QX264P04508
	D410, 420, 501	DIODE	1S2076A / 1S2471	QX264P04508
	D504, 508, 509	DIODE	1S2076A / 1S2471	QX264P04508
	D510, 511, 512	DIODE	1S2076A / 1S2471	QX264P04508
	D513, 516, 517	DIODE	1S2076A / 1S2471	QX264P04508
	D518, 519, 522	DIODE	1S2076A / 1S2471	QX264P04508
	D531, 532, 533	DIODE	1S2076A / 1S2471	QX264P04508
	D534, 535, 537	DIODE	1S2076A / 1S2471	QX264P04508
	D538, 540, 543	DIODE	1S2076A / 1S2471	QX264P04508
	D544, 541, 546	DIODE	1S2076A / 1S2471	QX264P04508
	D593	DIODE	1S2076A / 1S2471	QX264P04508
75	D943	DIODE	RM－1B	QX264P10105
76	D940, 941	DIODE	RM－1C	QX264P10106
77	D503	DIODE	HZ30－2	QX264P10404
78	D2R4, 2G4, 2B4	DIODE	MZ305B / EQA02－05CDB	QX264P19303
79	D302	DIODE	MZ312B / EQA02－11CDB	QX264P19306
80	D514	DIODE	MZ307B / EQA02－07CDA	QX264P22001
81	D2R1, 2G1, 2B1	DIODE	MZ310	QX264P22005
82	D505, 506, 507	DIODE	RU2	RX264P19601
	D526	DIODE	RU2	RX264P19601

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: HC3905ATKV
1~5000SETS BASE

ISSUED : MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
83	D6R2, 6G2, 6B2	DIODE	RC2	RX264P20901
84	T502	TRANSFORMER	H-OSC.	CP332P00301
85	T504	TRANSFORMER	FLYBACK	CP334P02601
86	T501, 503	TRANSFORMER	H-DRIVE	CP336P00901
87	T951	TRANSFORMER	CHOPPER	CP350P02001
88	T931	TRANSFORMER	POWER	CP350P03001
89	L953, 956	COIL	LH15J117SH	CP333P01001
90	L901	COIL	LINE-FILTER	CP351P02101
91	L902	COIL	LINE-FILTER	CP351P02203
92	L502	COIL	TRANS CHOKE	CP409P00201
93	L105	COIL	CORE FERRITE	CP410D00201
94	L201, 202, 203	COIL	CORE FERRITE	CP410D00202
	L204, 205, 2R1	COIL	CORE FERRITE	CP410D00202
	L2G1, 2B1, 2R3	COIL	CORE FERRITE	CP410D00202
	L2G3, 2B3, 2R4	COIL	CORE FERRITE	CP410D00202
	L2G4, 2B4, 601	COIL	CORE FERRITE	CP410D00202
95	L1H1, 1V1, 1H2	COIL	CORE FERRITE	CP411P00101
	L1V2, 1R2, 1G2	COIL	CORE FERRITE	CP411P00101

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
	L1B2, 1R2, 1G3	COIL	CORE FERRITE	CP411P00101
	L1B3	COIL	CORE FERRITE	CP411P00101
96	L507	COIL	PEAKING 68MH−K	QX325C10203
97	L6R2, 6G2, 6B2	COIL	PEAKING 1.8MH−K	QX325C11004
98	L6R1, 6G1, 6B1	COIL	PEAKING 4.7MH−K	QX325C11009
99	L2R5, 2G5, 2B5	COIL	PEAKING 0.56MH−M	QX325C11408
100	L505, 954	COIL	FILTER 100MH−K	QX409P00602
101	L951, 952, 955	COIL	FILTER 27MHK	QX409P00603
102	L501	COIL	PEAKING 1000MH−K	RX325D02902
103	L502	COIL	FILTER 180MH−K	RX409P01706
104		COIL	DEGAUSSING	CP409B00605
105		COIL	CORE FERRITE	CP410P00303
106	R910, 911	RESISTOR	CEMENT WIRE 5W 0.27−K	CP102P00108
107	R207	RESISTOR	METAL 1/4W 5.6K−F	CP103P04101
108	R204, 205	RESISTOR	METAL 1/4W 10K−F	CP103P04104
109	R315	RESISTOR	METAL−S 1/4W 470−F	CP103P06401
110	R307	RESISTOR	METAL−S 1/4W 680−F	CP103P06405
111	R5B3, 5C3	RESISTOR	METAL−S 1/4W 820−F	CP103P06407
112	R342	RESISTOR	METAL−S 1/4W 1K−F	CP103P06409

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
113	R308	RESISTOR	METAL—S 1/4W 3.3K—F	CP103P06601
114	R405	RESISTOR	METAL—S 1/4W 3.9K—F	CP103P06603
115	R575	RESISTOR	METAL—S 1/4W 4.3K—F	CP103P06604
116	R311, 578	RESISTOR	METAL—S 1/4W 4.7K—F	CP103P06605
117	R310, 313, 331	RESISTOR	METAL—S 1/4W 5.6K—F	CP103P06607
118	R574	RESISTOR	METAL—S 1/4W 6.8K—F	CP103P06609
119	R5C5	RESISTOR	METAL—S 1/4W 9.1K—F	CP103P06702
120	R512, 513	RESISTOR	METAL—S 1/4W 15K—F	CP103P06707
121	R401	RESISTOR	METAL—S 1/4W 18K—F	CP103P06709
122	R924	RESISTOR	METAL—S 1/4W 30K—F	CP103P06804
123	R314, 403	RESISTOR	METAL—S 1/4W 33K—F	CP103P06805
124	R404	RESISTOR	METAL—S 1/4W 75K—F	CP103P06904
125	R402	RESISTOR	METAL—S 1/4W 150K—F	CP103P07005
126	R5C1	RESISTOR	METAL—S 1/4W 180K—F	CP103P07007
127	R5B6	RESISTOR	METAL—S 1/4W 360K—F	CP103P07104
128	R312	RESISTOR	METAL—S 1/4W 390K—F	CP103P07105
129	R985	RESISTOR	CEMENT WIRE 5W 0.68—K	CP109D00306
130	R912, 913	RESISTOR	CEMENT WIRE 5W 0.27—K	CP109D00307
131	R907	RESISTOR	METAL 1/4W 11K—F	QX103P30500
132	R2R2, 2G2, 2B2	RESISTOR	METAL 1/4W 75K—F	QX103P30700

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: HC3905ATKV
1~5000SETS BASE

ISSUED: MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION		PARTS No.
133	R903, 946	RESISTOR	FUSE 1/4W 10−J	QX103P37001
134	R429, 573, 579	RESISTOR	FUSE 1/2W 1.2−J	QX103P39801
	R583, 5B9	RESISTOR	FUSE 1/2W 1.2−J	QX103P39801
135	R566	RESISTOR	FUSE 1/4W 100−J	QX109P05201
136	R901	RESISTOR	FUSE 1/4W 1.2−J	QX109P03102
137	VR501, 502	VARIABLE RESISTOR	SEMIFIXED 1/10W B−10K	CP127C00109
138	VR505	VARIABLE RESISTOR	SEMIFIXED 1/10W B−20K	CP127C00200
139	VR6R1, 6G1, 6B1	VARIABLE RESISTOR	SEMIFIXED 1/10W B−50K	CP129C50202
140	VR601	VARIABLE RESISTOR	SEMIFIXED 1/5W B100K ± 25%	QX127C03102
141	VR503, 504	VARIABLE RESISTOR	SEMIFIXED 1/2W B−2K	RX129C50706
142	C965, 966, 967	CAPACITOR	H180V 220M−Q	QX185D05201
143	AG601, 6R1, 6G1	SURGE−ABSORBER	DSP−301N	CP252P00101
	AG6B1	SURGE−ABSORBER	DSP−301N	CP252P00101
144	TH902	THERMISTOR	NTH18D8R0LB	CP265P00402
145	TH901	THERMISTOR	NTH13D160LB	CP265P00404
146	TH102	THERMISTOR	NTH5D473JA	CP265P00804
147	RP902	POSISTOR	PTH451A12BD180M290	CP265P01303

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: HC3905ATKV
1~5000SETS BASE

ISSUED: MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION/SPECIFICATION		PARTS No.
148	RP501	POSISTOR	PTH60U331M	CP265P02001
149	Q518	THYRISTOR	TF341M−A	CP269P00301
150	F401	FUSE	SSFR 1A	CP283P00104
151	F951	FUSE	SSFR 3A	CP283P00105
152	RY505, 506, 507	RELAY	VE−12H−K−UL	CP287P01001
153	RY501, 505, 506	RELAY	VE−12H5−K−UL	CP287P01002
	R507	RELAY	VE−12H5−K−UL	CP287P01002
154	X101	CERAMIC RESONATOR	CSA4.00MG	CP296P00102
155	X102	CERAMIC RESONATOR	CSA8.00MT	CP296P00104
156	S101, 107	SWITCH−SLIDE		CP439D00301
157	SW1X2, 1X3	TACT SWITCH		CP439P00603
158	SW1X1	SWITCH ROTARY		CP439P00901
159	S103	SWITCH DIP		CP439P01006
160	S201	BAND SWITCH		QX129P00709
161	S102	SWITCH SLIDE		RX439C52302
162	RY901	RELAY VS 100TBU−VD3		CP287P00701
163		SWITCH PUSH		CP432C00701
164		SWITCH PUSH		CP432C00901
165		VARIABLE RESISTOR	STD B−1K	RX129C50501
166		VARIABLE RESISTOR	STD B−5K	RX129C50503

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: HC3905ATKV
1~5000SETS BASE

ISSUED: MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION/SPECIFICATION	PARTS No.
167		COIL CORE FERRITE	CP410P00303
168		DIODE LN320GP (LED)	QX264P24601
169		ASSY PCB VIDEO	CT920B12601
170		ASSY PCB CRT	CT920D92201
171		ASSY PCB H-OUT1	CT920D92202
172		ASSY PCB HV-OUT1	CT920D92203
173		ASSY PCB DRIVE	CT920D92204
174		ASSY PCB REG1	CT920D92205
175		ASSY PCB REG2	CT920D92206
176		ASSY PCB POWER	CT920B12501
177		ASSY PCB PCC	CT920D92101
178		ASSY PCB LED20	CT920D92103
179		ASSY PCB SW	CT920D92104
180		ASSY PCB BRT/CONT	CT920D92105
181		ASSY PCB CONTROL	CT920D92106
* 182		ASSY PCB DEFL (OLD)	CT920B12401
183		ASSY PCB TERMINAL	CT920B12801
*		ASSY PCB DEFL (NEW)	CP210A10301
184		FUSE SEMKO 250V T3.5A	RX283D51102

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: HC3905ATKV
1~5000SETS BASE

ISSUED : MAR. 13th, 1990

ITEM	SYMBOL No.	DESCRIPTION / SPECIFICATION	PARTS No.
185		FRONT PANEL	CP700A03101
186		BACK COVER	CP700A03201
187		COVER VR	CP700A03301
188		REAR COVER	CP700A04501
189		PACKING CASE	CP802B01008
190		CUSHION (4pcs)	CP803A01301
191		PACKING BAG	RX831C53001
192		AC POWER CORD	RX245C50801
193		ACCESSORY	CP859C03305
		IC-HD614089FB95	CP266P08203

IC501 LA7852

PHASE SHIFFTER | SAW-TOOTH-GEN. | A.F.C | HORZ.-OSC | X-RAY

IC502 M5223P

IC503 TC4052BP

IC505 μPD6326C

IC506 μPD6326C

IC401 TDA1670A

REG | F.B GEN | OSC | RAMP GEN | AMP | SYNC | BUFFER

H-DRIVE

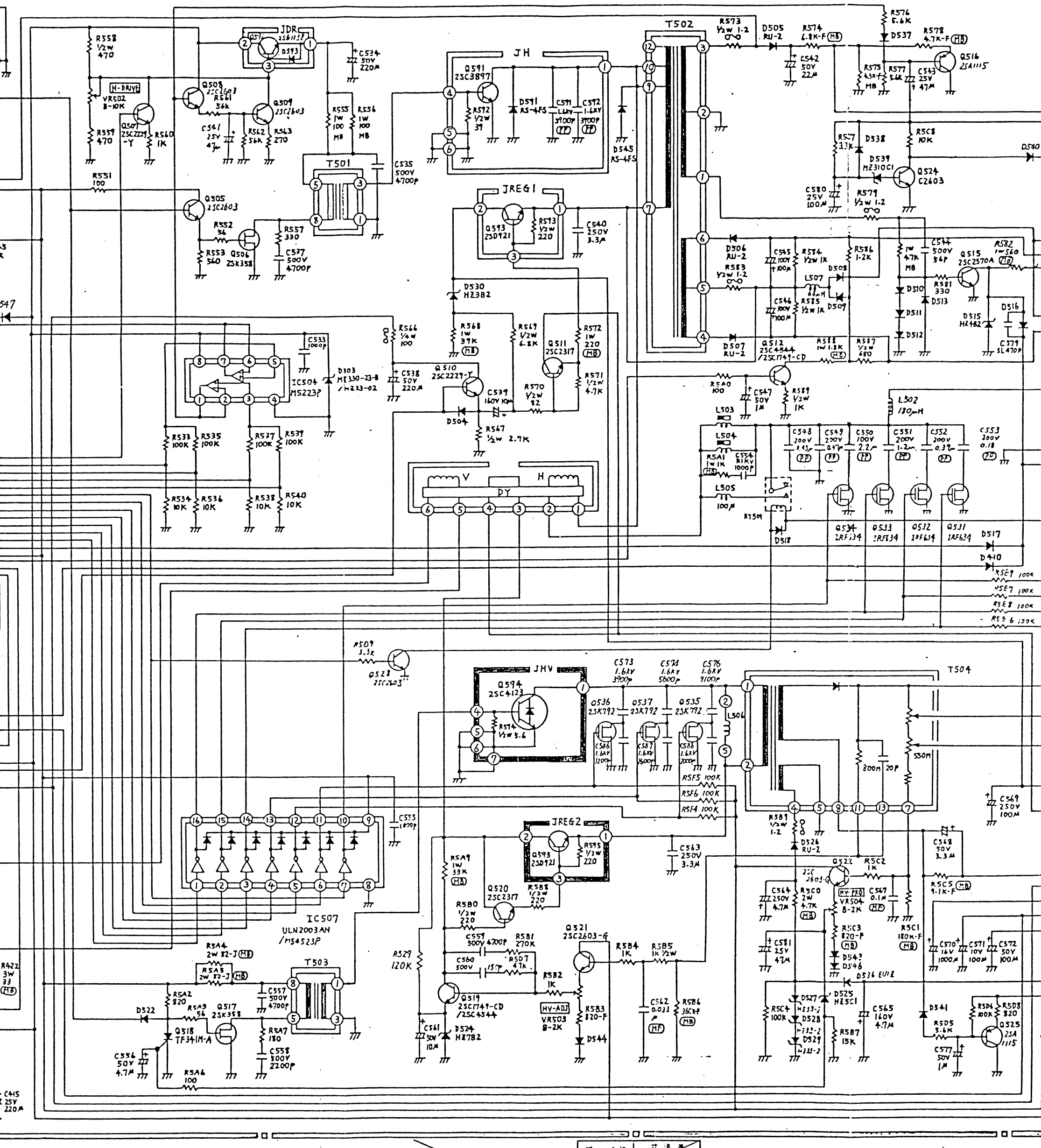
H-HOLD-1

H-HOLD-2

TO TERM: AFC1, AFC2, CS0, CR0, CR2, CR1, CS3, CS2, CSI, BLK, VD, SVCE, DCDT, DCBK, DLDI, GND, DLDO, HD

TO PCC: TOH, 24V, SVCE, SPA, KSN, HSIZ, PCC, GND

ITEM	APPLICABLE MODEL NO
	HC3905



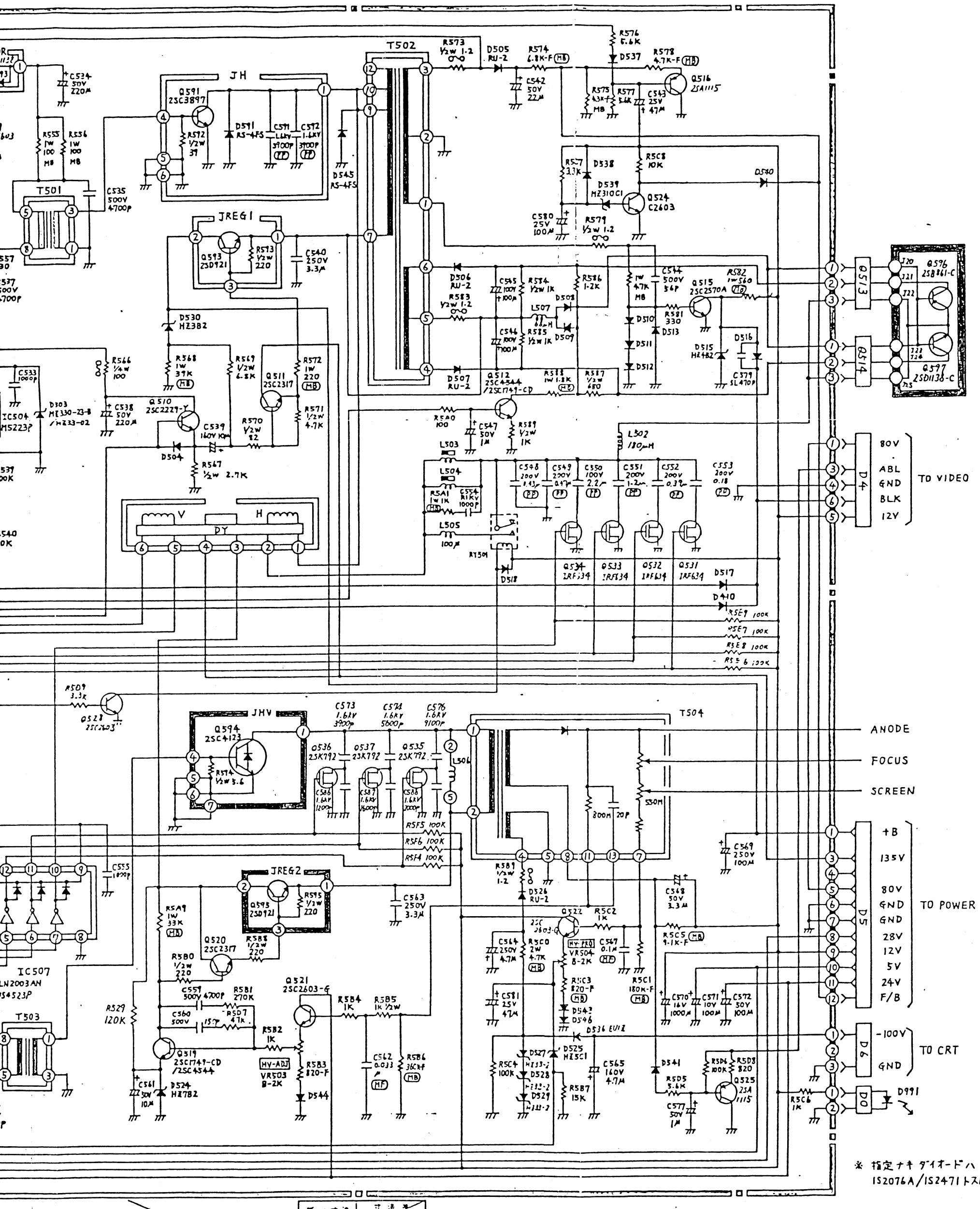
(1) 本文ノ寸法:B区間ヲ測ル
適合スル
THE PARTS MUST SATISFY THE FOLLOWING STANDARD OF SPEC NO. ITEM
(2) 量産前ニ見本ヲ 提出シ 適合確認ヲ得ル事
SAMPLES SHALL BE SUBMITTED TO ENG. DEPT. FOR TECHNICAL APPROVAL BEFORE PRODUCTION STARTS
(3) 打抜キニツリハ上ニ出ノコト
BURR 21/3 X THICKNESS MAX
(4) 指定ナキ打抜キ角ハR1ヨリ大ニスル
CORNERS ACCEPTABLE AT R1 UNLESS OTHERWISE SPECIFIED
(5) 指定ノナキ寸法許容差ハ右表ヲ適用スル。
TOLERANCE MUST BE IN ACCORDANCE WITH THE TABLE RIGHT HAND UNLESS OTHERWISE SPECIFIED

呼ビ寸法 RANGE OF DIMENSION	寸法差 ALLOWABLE TOLERANCE
TO 10	±0.5
ABOVE 10 TO 50	±0.8
ABOVE 50 TO 120	±1.2
ABOVE 120 TO 250	±2
ABOVE 250 TO 500	±3
ABOVE 500	±5
曲金ノ曲ケ角度ノ寸法許容差 ANGLE/SHEET METAL	±5°/100 (1辺)

a	A	1	HC3905 DEFL	
改番	改訂	品番	規格	MATERIAL AND DIMENSION

MITSUBISHI ELECTRIC CORPORATION

DIM IN mm	作成日付 DATE	— —	検図 APPROVED
尺度 SCALE	作成 DRAWN		
NTS	検図 CHECKED		
	設計 DESIGNED		


T502
T501
T504
JH
JREG1
JREG2
JHV
V
H
DY
IC507
LN2003AN
TO VIDEO
TO POWER
TO CRT
ANODE
FOCUS
SCREEN
※ 指定ナキダイオードハ
1S2076A/1S2471トスル.

| | | |

T2~T6

R G B H V

T1

L1R4 L1G4 L1B4 L1H2 L1V2

L1R1 L1G1 L1B1 L1H1 L1V1 L1R2 L1R3 L1G2 L1G3 L1B2 L1B3

C1V7 1000

C1R1 16V 33M C1G1 16V 33M C1B1 16V 33M

C1R5 C1G5 C1B5

Q1R1 2SK360 Q1G1 2SK360 Q1B1 2SK360

R1R1 75 R1G1 75 R1B1 75 S101

R1R2 39K R1R3 220 R1R4 39K

R1G2 39K R1G3 220 R1G4 39K

R1B2 39K R1B3 220 R1B4 39K

R1H3 10K R1H2 22K R1V3 10K R1V2 22K R1H1 75 R1V1 75 S102

C1V8 50V

R1R101 330×6

C1R3 SL18 C1R4 SL18 C1G3 SL18 C1G4 SL18 C1B3 SL18 C1B4 SL18

D1R1 MZ-310 D1R2 MZ-310 D1G1 MZ-310 D1G2 MZ-310 D1B1 MZ-310 D1B2 MZ-310

L101~L104 2BF504

D101~D102 MZ310

R11A 1K×3 R110 1K×3

S103

L105

IC101 CLA-164TM

CRL (TEXT) GRL (TXCO) ABL (TXCI) NC PSL (TTL0) STL (TTL1) POL MEL ATH MNH (MONO) CGH GND OSH ATL OSH 16H PRH SRH PGH NC SGH PBH SBH Vcc

RPD RNO NC RC2 NC RC1 RBR GND BPD BNO BC2 BC1 GND BBR GAN GBW GND GPD GNO GC2 NC GC1 GBR GND

C108 1000 R1R6 100 R1R7 R1B6 100 R1B7 R1A4 75 R1G8 220 R1G4 100 R1G7

C107 1000

R111 3.3K R112 2.2K THI02 47Ω C106 25V 33M C104 16V 47M C105 16V 47M

R115 3.7K C165 1000 SL Q104 2SC2412K-R R116 3.9K

IC103 C114 16V 22 Q103 2SC2412K-R

R118 10CK Q102 2SA1037K

R113 8.2K R114 2.2K C166 1000 SL C113 16V 22

IC103 --- NJM2904M

C1R2 25V 33M C1G2 25V 33M C1B2 25V 33M

12V R1RC 1K 12V R1GC 1K 12V R1BC 1K

R121 1K

S107

DIR3 DIR4 DIR5 DIB3 DIB4 DIB5 DIG3 DIG4 DIG5

R1R8 150 R1B8 150 R1G8 150

D103~D105 MA170FD MA150FD

R146 180×3 R119 560×3 R120 180×3

IC102 M52001SP

R102 100K-F R106 33K

C170 50V 0.47M R103 22K C121 1800P SL C122 6800P SL R104 100K

R107 0Ω C123 50V 4.7 C124 4.7M R160 0Ω C125 50V 4.7 C126 100 C127 4.7M R161 0Ω C128 4.7M C129 100P C130 4.7M C131 0.22M R105 33K C132 SL50V 16P

C136 56P SL C135 25V 100M C134 1000P C137 25V 100M C138 1000P

R108 22K R109 68K

12V 5V H-O Sync on V GND H/C -IN V-IN V-O

D127 HZK6B TR

C133 150P

5V

IC107 14013

C161 50V 100P

T7 TO. SW

T8 TO. MNPN

TA

12V 5V

ITEM	APPLICABLE MODEL NO
2	HC3505
1	HC3505

NO	DATE	CHANGE	BY
(1-15)	87-7-12	SIGNETICS IC173	
(2-12)	87-7-21	PICTURE CONTROL	
(2-22)	87-8-22	RIH2.RIH3.RIV1.RIV3	
(F-6)		IC107, C161	
(3-1)		2	
(F-6)		RIH1 3.3K→10K	
(F-11)			

PICTURE CONTROL

T9 — TO VIDEO

TX — TO TERM (T7)

5V
ITM3
ITM2
ITM1
ITM0
DOWN
.UP
GND
SHIELD

R1X1 47k×6 S1X1 S1X3 S1X2

S107

C1R2 25V 33μ + R1RC 1K 12V
C1G2 25V 33μ + R1GC 1K 12V
C1B2 25V 33μ + R1BC 1K 12V
R121 1K
R1R8 150
R1B8 150
R1G8 150
R120 150×3

DIR3 DIR4 DIR5
DIB3 DIB4 DIB5
DIG3 DIG4 DIG5
D103~D105 MA170FD /MA150FD

T7 TO. SW

SHIELD
BRTU
BRTD
GND
5V
UP
DOWN
ITM3
ITM2
ITM1
ITM0

T8 TO. MNPN

STS
SOT
SIN
SCK
GND

TA

L101 L103 L102 L104
C111 1000P
C112 1000P
R123 47K R122 47K
R162 R163
R164 R165 R177
R130 1M
C140 50P
C139 50P
X101 4.9152
R157 3.3K R156 3.3K
R166 47K R167 47K
R168 1K R169 1K
D102 D103
C141 1000P C142 1000P
R131 1K R132 1K
D104 D105
C143 1000P C144 1000P
R133 47K×4
C145~C148 1000P
R134 47K R135 47K
D106 D107 D108 D109
C149 1000P
R137 820K
TF C150 0.1M
R136 47K×4
INT E2CK E2BS DT3 DT2 DT1 DT0 CE VSS
IC106 CXK1009P

IC104 MPU
OSCI OSC2 D7 DF D6 D5 D1 Vcc D2 D3 D4 D0 D8 D9 DC DD DE
R41 R40 R20 R21 R22 R23 R32 R33 R71 R72 R73 RSET R80 R81 R82 R83 R70 R43 R42 R62 R63 R53 R52 R51 R50 R10 R11 R12 R13 R00 R01 R02 R30 R31

R142 3.3K
X102 8MHz
C151 560P C152 560P
IC108 PST520C
C154 1000P C155 1000P R143 22K C156 16V 10μ
R176 1K
R178 47K
C153 1000P C164 1μ
R138 47K×3 R139 47K×4 R140 4.7K R141 4.7K
R175 1.5K
R174 1.5K R179 47K
R180 47K R181 47K

IC105 G/A
SPTY SNTP FRN OSCI FVIT FHIT STHO STM1 STM2 STM3 RSET DCD0 DCD1 DCD2 DCD3 WDRT DCKA DCLR
PWRT TSWH CLAM DCDT GND GND GND GND HO HI VO VI VD HD
R144 1K C157 25V 1μ R145 10K C158 25V 1μ

IC109 μPD632AC
C159 1000P C160 1000P
R171 18K R172 18K R173 18K RM8 10K
R159 3.3K R158 10K R149 10K

D110 D111 D112 D113 D114 D115 D116 D117 D118 D119 D120 D121 D122 D123 D124 D125 D126
C162 1000
DCDT VD HD BLNK SVCE DLDO DCKB DLDI CRO CRI CR2 CS0 CS1 CS2 CS3 AFC0 AFC1

呼ビ寸法 RANGE OF DIMENSION	寸法差 ALLOWABLE TOLERANCE			
UP TO 30	±0.5	±0.2	±1.0	±2.0
ABOVE 30 TO 60	±0.7	±0.3		
ABOVE 60 TO 120		±0.5	±1.5	±3.0
ABOVE 120 TO 250	±1.0	±0.7		
ABOVE 250 TO 500	±1.5	±1.0	±2.0	±4.5
ABOVE 500		±1.5	±2.5	±5.0

鉄金ノ曲ゲ角度ノ寸法許容差ハ右表ヲ適用スル。 ANGLE:SHEET METAL ±1° 75/100(1度)

(1) 部品規格:別紙規格適用スル
THE PARTS MUST SATISFY THE FOLLOWING STANDARD OF SPEC NO ITEM
(2) 量産前ニ見本ヲ 個 ショット検査前ニ提出シ了解ヲ得ル事ヲ要ス
SAMPLES SHALL BE SUBMITTED TO ENG. DEPT FOR TECHNICAL APPROVAL BEFORE PRODUCTION STARTS
(3) 打抜キカエリハ1/5 X THICKNESS MAX
BURR:1/5 X THICKNESS MAX
(4) 指定ナキ打抜キ角ハR1~R3トスル
CORNERS ACCEPTABLE AT R1~3 UNLESS OTHERWISE SPECIFIED
(5) 指定ノナイ寸法許容差ハ右表ヲ適用スル。
TOLERANCE MUST BE IN ACCORDANCE WITH THE TABLE RIGHT HAND UNLESS OTHERWISE SPECIFIED

d	A	2	HC3505 TERMINAL
d	A	1	HC3905 TERMINAL

改番 CHANGE NO. | 設番 DEV. NO. | 品番 ITEM NO. | 名称 規格 MATERIAL AND DIM

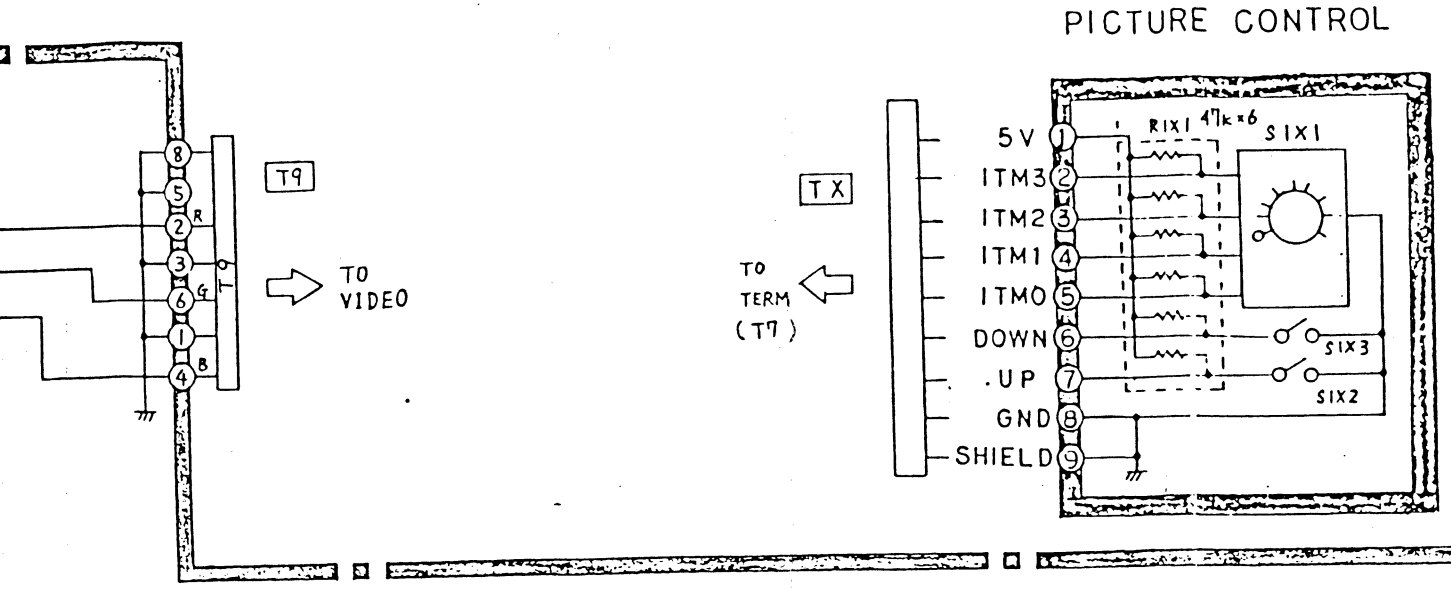
出図先 ( )
検
尺度 SCALE NTS
DIM IN mm
作成日付 DATE
作成 DRAWN
調査 CHECKED
設計 DESIGNED

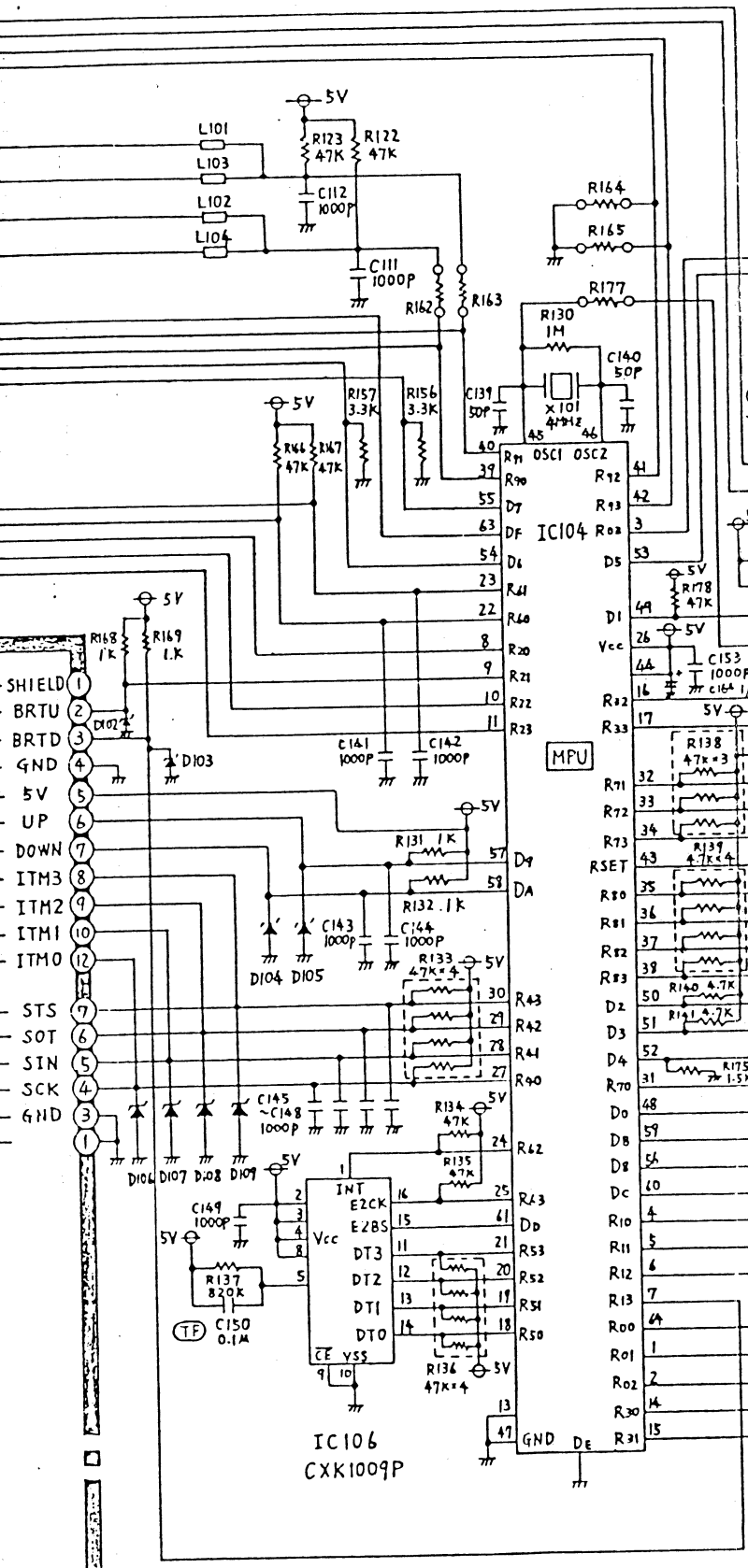
MITSUBISHI ELECTRIC COR

9 10 11 12 13 14 15 16

A B C D E F G H J K

PICTURE CONTROL





	R150	R170	R182
HC3905	12k	22k	12k
IIC3505	5.6k	12K	8.2k

(1) 部品ハ次ノ規格ヲ満足スルコト
THE PARTS MUST SATISFY THE FOLLOWING STANDARD OF SPEC NO. ITEM
(2) 量産前ニ見本ヲ 種 ショットヲ提出シ技術ニ承認ヲ得ルコト
SAMPLES SHALL BE SUBMITTED TO ENG. DEPT FOR TECHNICAL APPROVAL BEFORE PRODUCTION STARTS
(3) 打抜キカエリハキレイニ仕上ノコト
BURR 1/5 × THICKNESS MAX
(4) 指定ナキ打抜キ角ハR1～R3トスル
CORNERS ACCEPTABLE AT R1～3 UNLESS OTHERWISE SPECIFIED
(5) 指定ノナイ寸法許容差ハ右表ヲ適用スル。
TOLERANCE MUST BE IN ACCORDANCE WITH THE TABLE RIGHT HAND UNLESS OTHERWISE SPECIFIED

呼ビ寸法 RANGE OF DIMENSION	寸法差 ALLOWABLE TOLERANCE 板金 SHEET METAL	成形品 PLASTIC	木製品 WOOD	紙製品 PAPER
UP TO 30	±0.5	±0.2	±1.0	±2.0
ABOVE 30 TO 60	±0.7	±0.3		
ABOVE 60 TO 120		±0.5	±1.5	±3.0
ABOVE 120 TO 250	±1.0	±0.7		
ABOVE 250 TO 500	±1.5	±1.0	±2.0	±4.5
ABOVE 500		±1.5	±2.5	±5.0

角度 ANGLE / 板金ノ曲ゲ角度ノ寸法差 SHEET METAL ±1° 75/100 (1度)

改番 CHANGE NUMBER	設計 DES.	品番 ITEM	規格 MATERIAL AND DIMENSION	(M) MARK	UNIT	数量 QUANTITY	備考 REMARK
d	A	2	HC3505 TERMINAL		50		
d	A	1	HC3905 TERMINAL		50		

出図先 ( )

DIM IN mm | 尺度 SCALE | NTS

MITSUBISHI ELECTRIC CORPORATION

作成日付 DATE	— —	検図 APPROVED
作成 DRAWN		
調査 CHECKED		
設計 DESIGNED		

TERMINAL CIRCUIT

TITLE (5~22)

SCHEMATIC DIAGRAM

DWG. No (23~31)

PAGE 1/1

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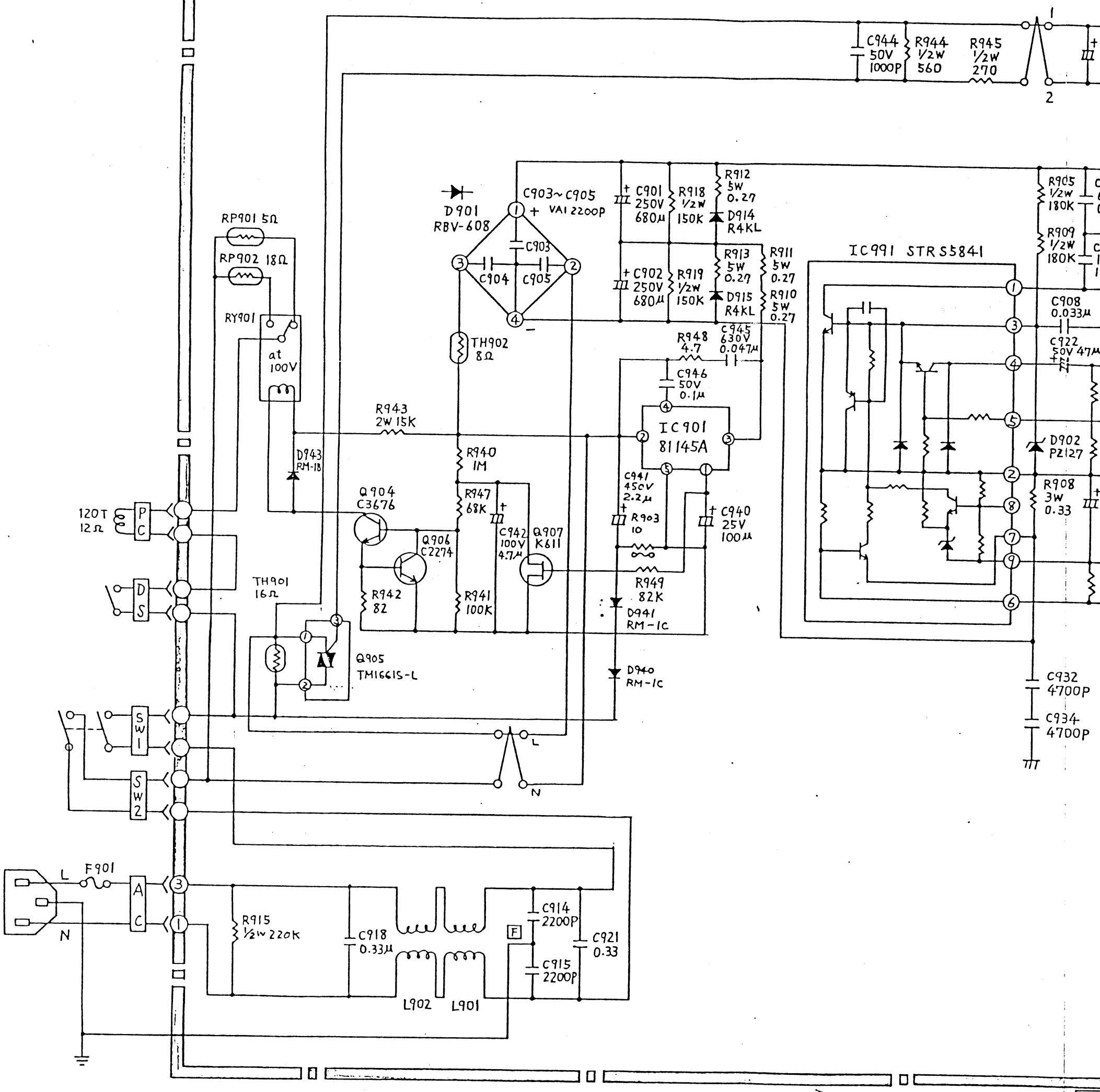
10 11 12 13 14 15 16

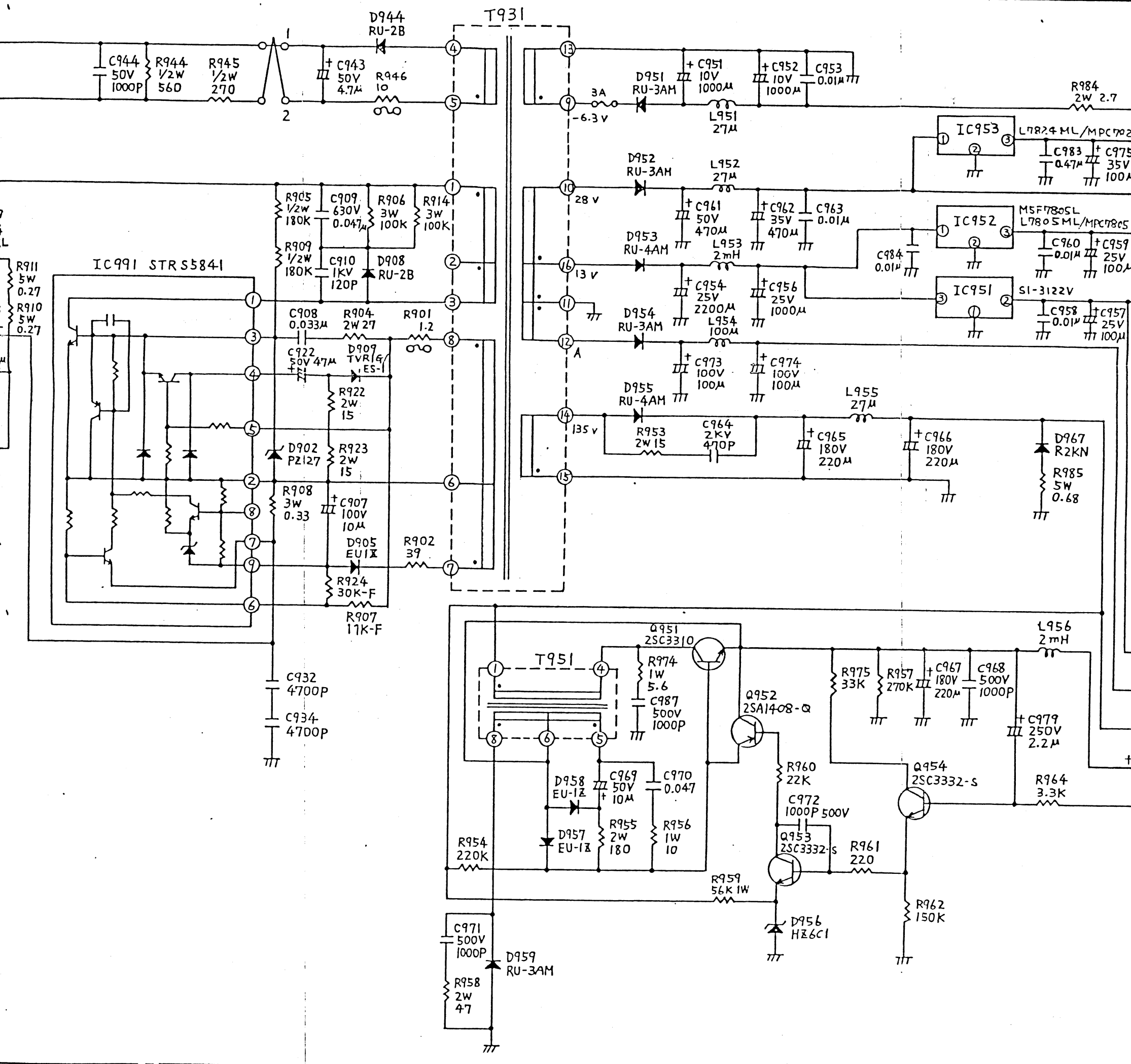


ITEM	APPLICABLE MODEL NO.
品番	件名
2	HC-3505
1	HC-3905

(1) 意匠部品環境試験規格
適用スル
THE PARTS MUST SATISFY THE FOLLOWING STANDARD OF SPEC. NO. ITEM
(2) 量産前ニ見本ヲ 個 ショット担当技術課ニ提出シ了解ヲ得タ後量産ノコト
SAMPLES SHALL BE SUBMITTED TO ENG. DEPT. FOR TECHNICAL APPROVAL BEFORE PRODUCTION STARTS.
(3) 打抜キカエリハ t 以内ノコト
BURR : 1/5 X THICKNESS MAX.
(4) 指定ナキ打抜キ角ノRハR1~R3トスル
CORNERS ACCEPTABLE AT R1~3 UNLESS OTHERWISE SPECIFIED
(5) 指定ノナイ寸法許容差ハ右表ヲ適用スル。
TOLERANCE MUST BE IN ACCORDANCE WITH THE TABLE RIGHT HAND UNLESS OTHERWISE SPECIFIED.

呼	R	D
ABOV		
ABOV		
ABOV		
ABOV		
ABOV		

改定 CHANGE		
a	(D-2), (D-4) 抵抗値変更 R943, C945 ノ位置ヲ変更 LINE FILTER 追加	'89-6-2 ウナイダ
b	(C-1) 部品2追加	'89-12-4 CR997C289 ムナセ
	(C-7) T931-②元 80V (D-9) P2-12 元 80V (F-10) 変化表追記ニヨリ (1-6) 誤記訂正 R HC-3905 HC-3505	
c	(7-6) 誤記訂正 R HC-3905 POWER HC-3505 POWER 回路図	'90-1-9 CR997C332 ウナイダ
d	(8-9) P1-④,⑥ 追記	'90-7-29 CR997C326 ヨコイ
e	(E-7) ヘ 0952 ハ 2SA1021-b デ"	'90-7-13 CR997C429 ホリグチ



(1) 意匠部品環境試験規格適用スル
THE PARTS MUST SATISFY THE FOLLOWING STANDARD OF SPEC. NO. _____ ITEM _____
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TOLERANCE MUST BE IN ACCORDANCE WITH THE TABLE RIGHT HAND UNLESS OTHERWISE SPECIFIED.

呼ビ寸法 RANGE OF DIMENSION	寸法差 ALLOWABLE TOLERANCE 板金 SHEET METAL	成形品 PLAS. TIC	木製品 WOOD EN	紙製品 PAPER ETC
UP TO 30	±0.5	±0.2	±1.0	±2.0
ABOVE 30 TO 60	±0.7	±0.3		
ABOVE 60 TO 120		±0.5	±1.5	±3.0
ABOVE 120 TO 250	±1.0	±0.7		
ABOVE 250 TO 500	±1.5	±1.0	±2.0	±4.5
ABOVE 500		±1.5	±2.5	±5.0

折金ノ曲ゲ角度ノ寸法差 ±1.75/100 (1度)
ANGLE(SHEET METAL) ±1.75/100 (1DEG)

改番 CHANGE MARK	32 副番 REV NO.	33 品番 ITEM	34 サイズ SIZE	規格 MATERIAL AND DIMENSION	(MI) MARK	UNIT CODE	改定通知番号
e	A	2		HC 3505 POWER		50	
e	A	1		HC 3905 POWER		50	

出図先 ( )
控
其ノ他

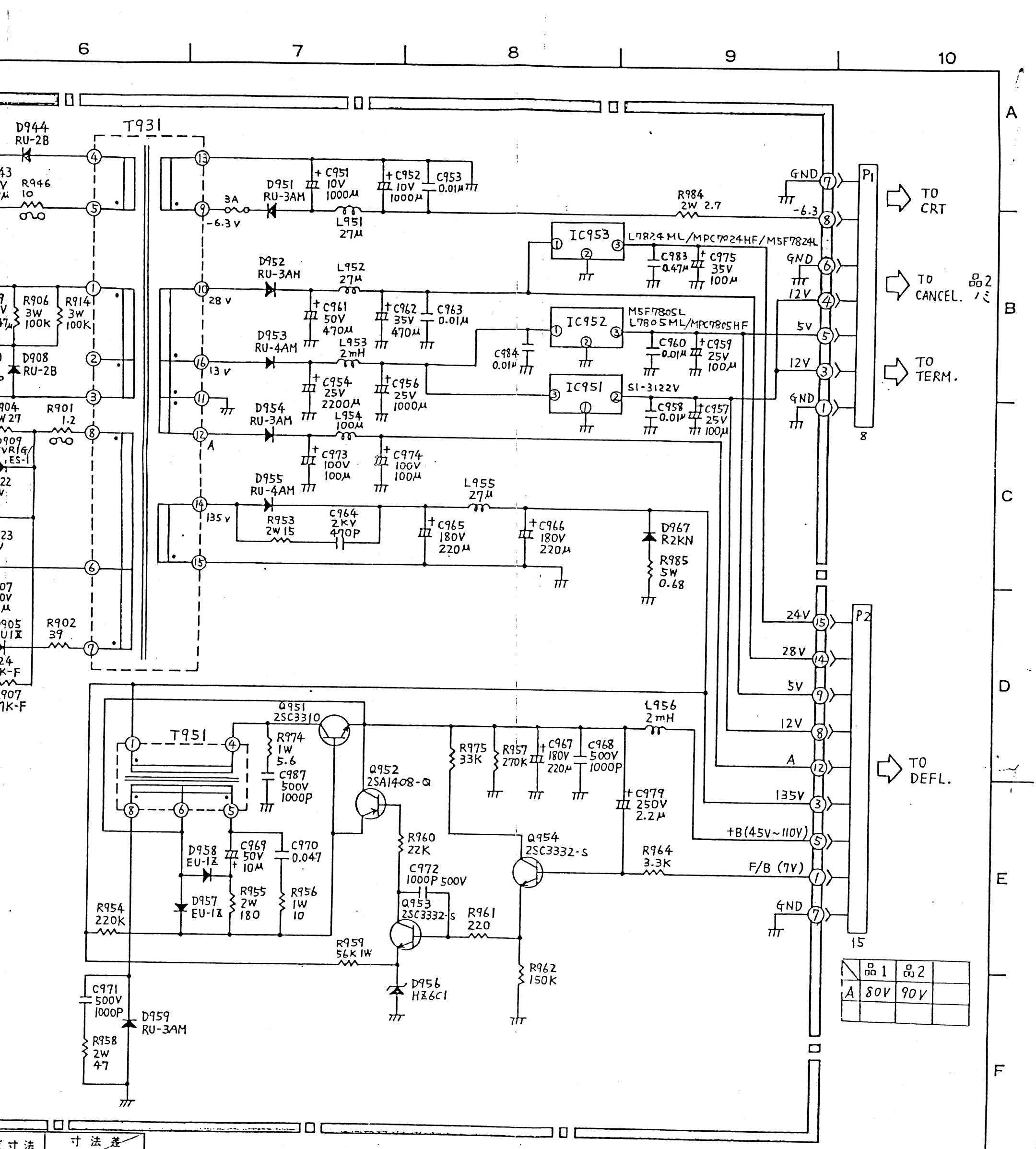
DIM. IN mm
尺度 SCALE : NTS

MITSUBISHI ELECTRIC CORPORATION

作成日付 DATE	— : —	検認 APPROVED
作成 DRAWN		
照査 CHECKED		
設計 DESIGNED		

POWER
TITLE (5～22)
SCHEM
DWG. No. (23～

11



寸法 / GE OF ENSION	寸法差 ALLOWABLE TOLERANCE 板金 SHEET METAL	成形品 PLAS. TIC	木製品 WOOD EN	紙製品 PAPER ETC
TO 30	±0.5	±0.2	±1.0	±2.0
30 TO 60	±0.7	±0.3		
60 TO 120		±0.5	±1.5	±3.0
120 TO 250	±1.0	±0.7		
250 TO 500	±1.5	±1.0	±2.0	±4.5
500		±1.5	±2.5	±5.0

曲ゲ角度ノ寸法差 ±1.75/100 (1度)
EISHEET METAU ±1.75/100 (1DEG)

改番 CHANGE MARK	32 副番 REV NO.	33 品番 ITEM	34	規格 MATERIAL AND DIMENSION	(MI) MARK	UNIT CODE	改定通知番号	改定切替月日	摘要 REMARK
e	A	2		HC 3505 POWER		50			
e	A	1		HC 3905 POWER		50			

出図先 ( )
控
其他

MITSUBISHI ELECTRIC CORPORATION

DIM. IN mm	作成日付 DATE	— —	検認 APPROVED
尺度 SCALE	作成 DRAWN		
: NTS	照査 CHECKED		
	設計 DESIGNED		

POWER

TITLE (5~22)

SCHEMATIC DIAGRAM

DWG. No. (23~31)

PAGE 1/1

11

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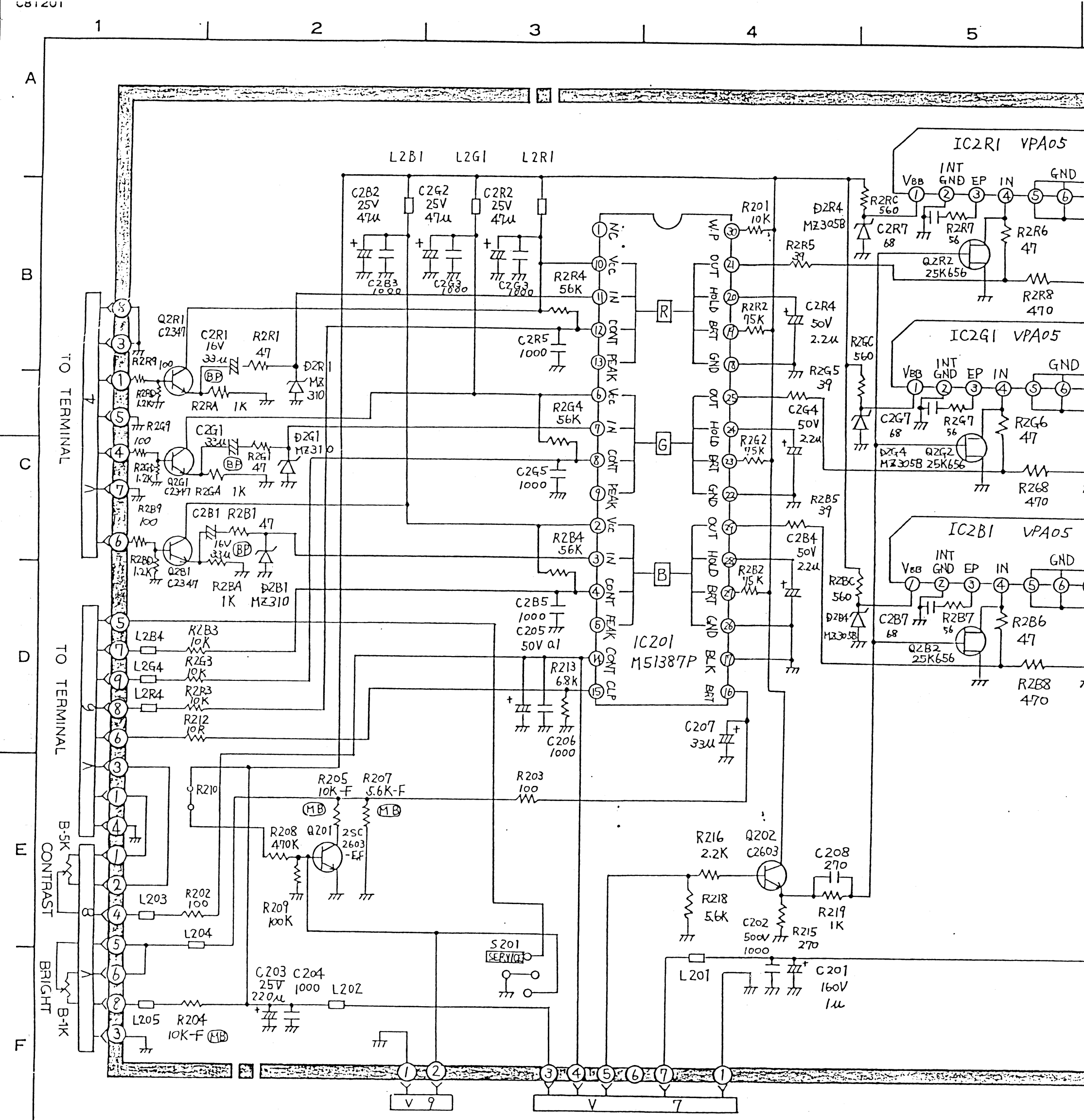

ITEM	APPLICABLE MODEL NO.
1	HC3905

(1) 量産部品環境試験規格
適用スル
THE PARTS MUST SATISFY THE FOLLOWING STANDARD OF SPEC. NO. ITEM
(2) 量産前ニ見本ヲ 個 ショット担当技術課ニ提出シ了解ヲ得タ後量産ノコト
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BURR :1/5 × THICKNESS MAX.
(4) 指定ナキ打抜キ角ハR1～R3トスル
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(5) 指定ナイ寸法許容差ハ右表ヲ適用スル
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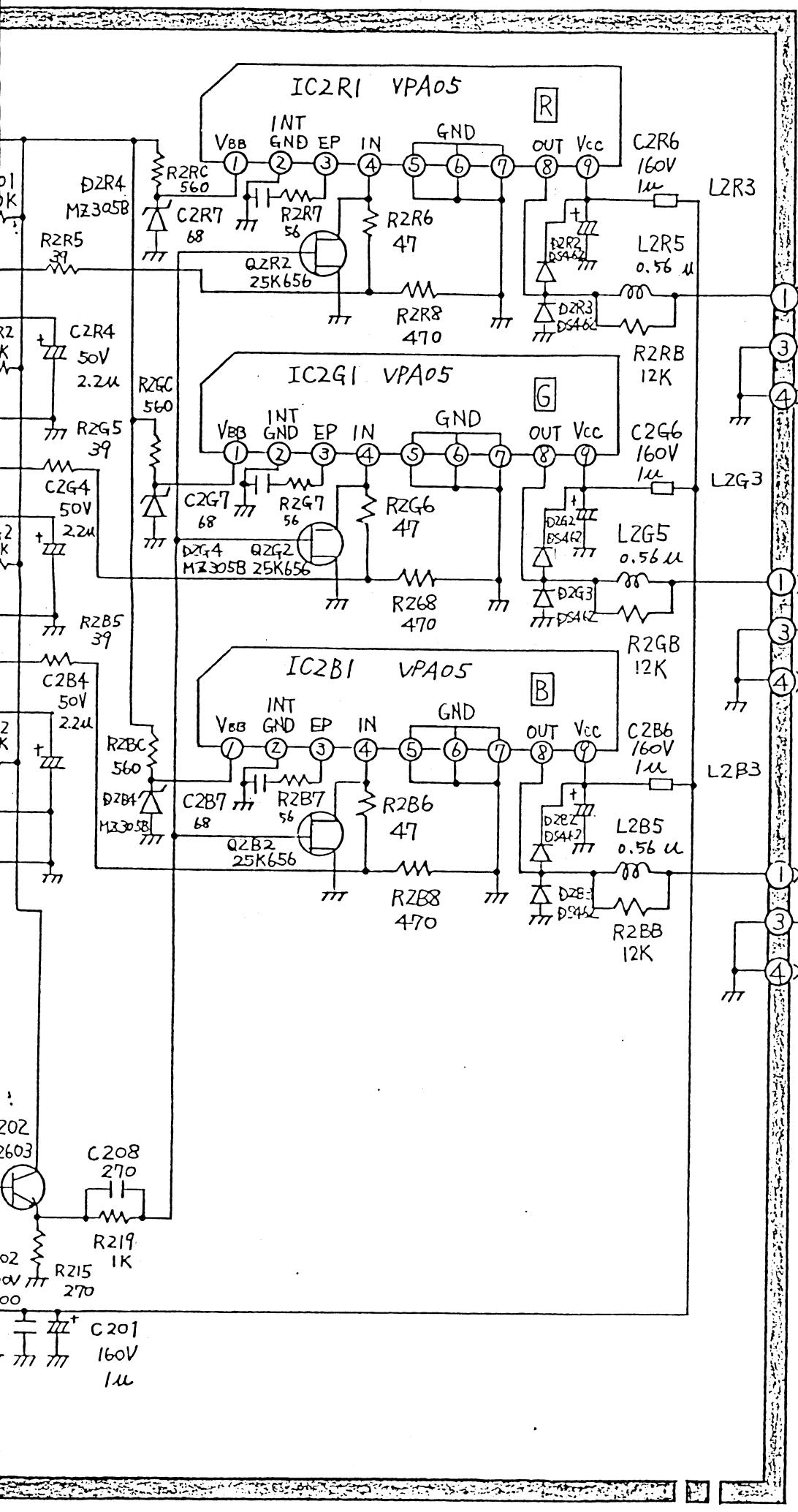
改定 CHANGE		
(1-E) ノイズキンシコンデンサ ヲ ①②③④⑤⑥⑦ ニ ソクテイ シ ソノ ケッカ ヲ ﾃﾝﾌﾟ-ﾌﾟ ﾃｲｷ ニ ﾃﾝﾌﾟ		
(8-B) L6R1 ヲ 1μ, L6R2 ヲ 1μ		
(8-C) L6G1 ヲ 1μ, L6G2 ヲ 1μ		
(8-D) L6B1 ヲ 1μ, L6B2 ヲ 1μ		
(2-F) C203 ﾉ ｱﾅｦ 47μ		
(5-B) C2R7 ヲ 100, R2R7 ヲ 10		
(5-C) C2G7 ヲ 100, R2G7 ヲ 10		
(5-D) C2B7 ヲ 100, R2B7 ヲ 10		
(6-B) L2R5 ヲ 0.82μ, R2R5 ヲ 1K		
(6-C) L2G5 ヲ 0.82μ, R2G5 ヲ 1K		
(6-D) L2B5 ヲ 0.82μ, R2B5 ヲ 1K		
本文ヲ ﾊﾝﾄｳﾀｲ ﾆ ｽﾙ 930720 ﾖﾘ ｼﾖｳ		
ﾃﾞｨｰﾌﾟ ﾆｭｰｽ ﾋﾄﾏﾂ		
コネクター相手先記入シタ (1-E) ﾌｸｼﾏ-ﾃﾞﾝｷ 記ｼﾀ '90-5-7		



L201~L205, L201~L203, L601 ハ 2BF503D-00 トスル。

(1) 意匠部品環境試験規格 適用スル
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TOLERANCE MUST BE IN ACCORDANCE WITH THE TABLE RIGHT HAND UNLESS OTHERWISE SPECIFIED.

呼ビ寸法 RANGE OF DIMENSION	寸法差 ALLOWABLE TOLERANCE 板金 SHEET METAL	成形品 PLASTIC	木製品 WOODEN	当紙等 PAPER ETC
UP TO 30	±0.5	±0.2	±1.0	±2.0
ABOVE 30 TO 60	±0.7	±0.3		
ABOVE 60 TO 120		±0.5	±1.5	±3.0
ABOVE 120 TO 250	±1.0	±0.7		
ABOVE 250 TO 500	±1.5	±1.0	±2.0	±4.5
ABOVE 500		±1.5	±2.5	±5.0

板金ノ曲ケ角度ノ寸法差 ±1.75/100 (1度) ANGLE(SHEET METAU) ±1.75/100 (1DEG)

改番 CHANGE MARK	32 副番 REV NO.	33 品番 ITEM	34 サイズ	規格 MATERIAL AND DIMENSION	(MI) MARK	UNIT CODE	改定通番号
C	A	1		HC3905 VIDEO-CRT		50	

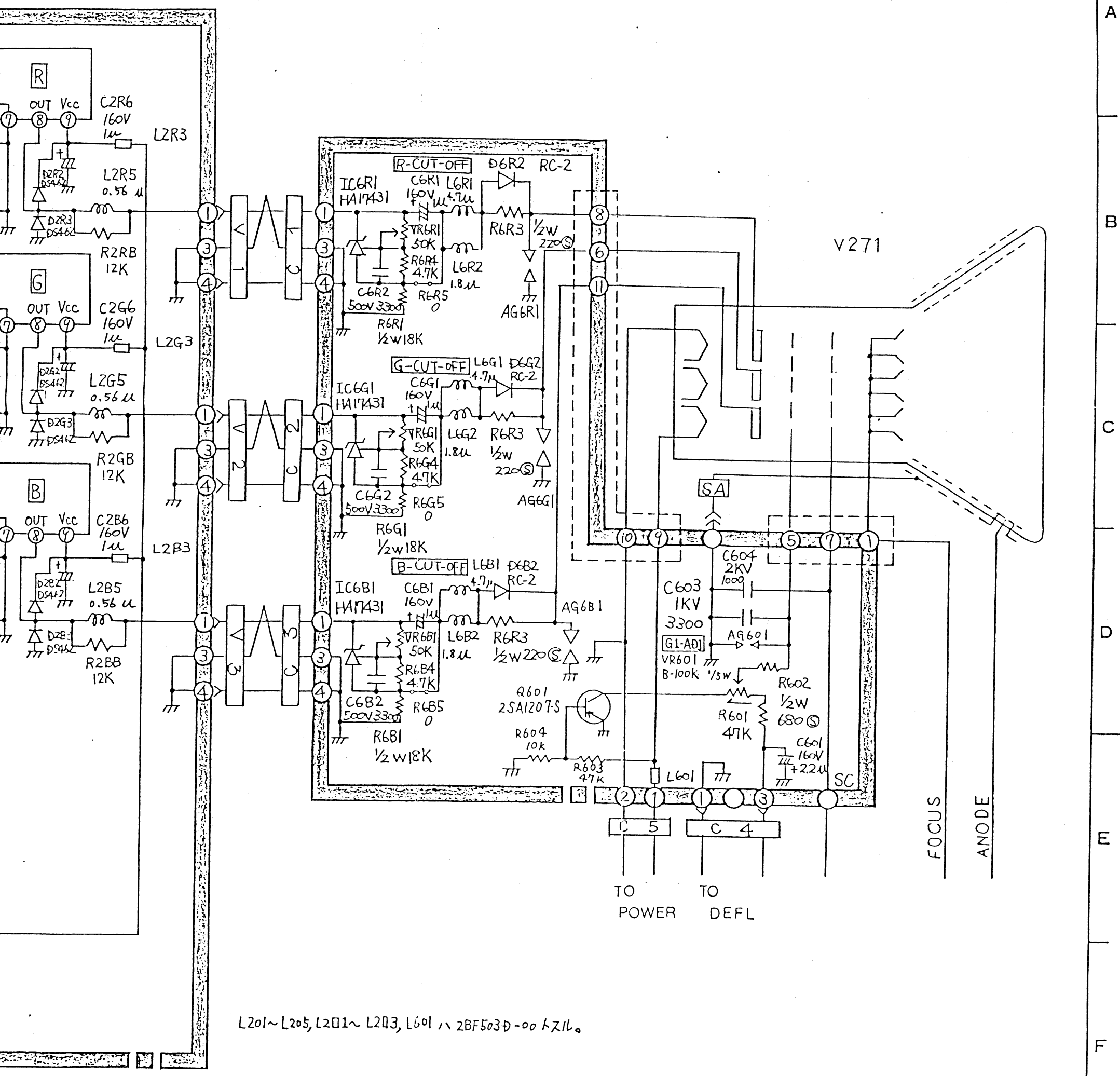
出図先 ( )
控
基板

DIM. IN mm
尺度 SCALE
NTS

MITSUBISHI ELECTRIC CORPORATION

作成日付 DATE	— —	検認 APPROVED
作成 DRAWN		
照査 CHECKED		
設計 DESIGNED		

VIDEO
TITLE (5~22)
SCHE
DWG. No. (23~



L201~L205, L201~L203, L601 ハ 2BF503D-00 トスル。

呼ビ寸法 RANGE OF DIMENSION	寸法差 ALLOWABLE TOLERANCE 板金 SHEET METAL	成形品 PLASTIC	木製品 WOODEN	紙製品等 PAPER ETC
UP TO 30	±0.5	±0.2	±1.0	±2.0
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OVE 500		±1.5	±2.5	±5.0

板金ノ曲ケ角度ノ寸法差 ±1.75/100(1度) ANGLEISHEET METAU ±1.75/100 (1DEG)

改番 CHANGE MARK	32 副番 REV NO.	33 品番 ITEM	34 マージン	規格 MATERIAL AND DIMENSION	(MI) MARK	UNIT CODE	改定通知番号	改定切替月日	79	80	81 82 83 84 85	摘要 REMARK
C	A	1		HC3905 VIDEO-CRT		50						

出図先 ( )

控

基板

MITSUBISHI ELECTRIC CORPORATION

DIM. IN mm	作成日付 DATE	— —	検認 APPROVED
尺度 SCALE	作成 DRAWN		
: NTS	照査 CHECKED		
	設計 DESIGNED		

VIDEO-CRT CIRCUIT

TITLE (5~22)

SCHEMATIC DIAGRAM

DWG. No. (23~31)

PAGE 1/1